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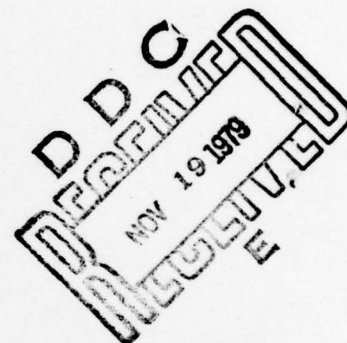
Research Memorandum 76-11

# PLANIT SUPPORT PROGRAMS--
# OPERATOR/USER MANUAL

Richard F. Bergfeld, James L. Cilva, Barry Seid,
James M. Fletcher and Alan M. Hoff
Litton Systems Incorporated

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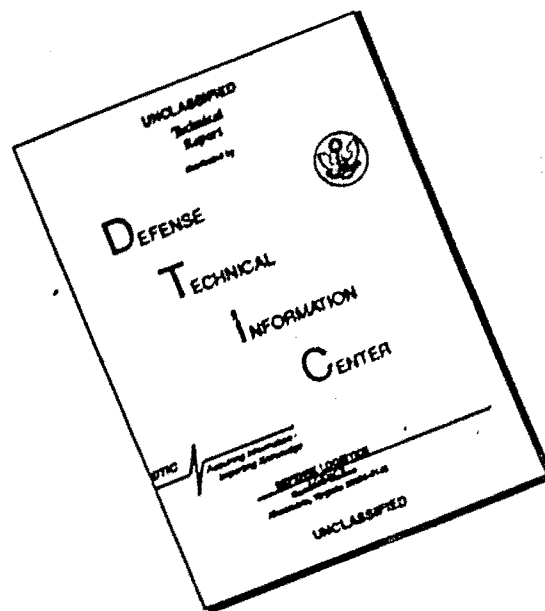
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# (6) PLANIT SUPPORT PROGRAMS-- OPERATOR/USER MANUAL .

Version 2.0/2.1

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Submitted by:
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EDUCATIONAL TECHNOLOGY AND TRAINING SIMULATION TECHNICAL AREA

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the Behavioral and Social Sciences

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# ABSTRACT

This document presents the general operational information and specific procedural data for the operation and use of the PLANIT Support Programs. These programs were developed as a part of the system installation of PLANIT (Programming Language for Interactive Teaching) on the AN/GYK-12 (TACFIRE) computer.

Additional information on the operation and use of the AN/GYK-12 PLANIT installation is presented in the following documents:

PLANIT Utility Program Operator/User Manual
   (Litton Document No. 125201-900)
PLANIT Support and Utility Programs Flow Charts
   (Litton Document No. 125202-950)
PLANIT Author's Guide [SDC Document No. TM-(L)-4422/001/01]
PLANIT Language Reference Manual [SDC Document No. TM-(L)-4422/002/01]
Document Update Information for PLANIT, Version 2.0
   (Northwest Regional Educational Laboratory document)

The PLANIT Support Programs were developed as a part of a Litton Systems, Inc., Data Systems Division (DSD), contract with the U. S. Army Research Institute for the Behavioral and Social Sciences (ARI). This contract (# DAHC19-74-C-0064) was awarded on 11 June 1974 as a part of an overall ARI research project which addresses the application of tactical computers to training. This contract specifically addressed the installation of the PLANIT author/student language on the U. S. Army Artillery Tactical Fire Direction System (TACFIRE) general purpose computer. This computer (AN/GYK-12) is also used in several other Army tactical computer systems.

The successful completion of this contract included the delivery and demonstration of a fully operational PLANIT system on the AN/GYK-12 computer. This project included the development of a translator and translation of PLANIT (version 2.6) from FORTRAN to TACPOL (AN/GYK-12 computer programming language). This task was accomplished under a separate ARI contract to the Northwest Regional Educational Laboratory. The Litton contract included the development of the operating system, machine input/output programs, system start and termination routines, utility support programs, and system integration and support to the installation of PLANIT on the AN/GYK-12 system.

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# BACKGROUND OF THE PLANIT USER TRAINING SYSTEM

Several explicit user requirements converged to generate the research which resulted in the documents contained in this set of reports. The need for some type of user training subsystem in support of tactical automatic data processing (ADP) system developments was clearly established during the evolutionary phase of the Army Tactical Operations System (TOS) development in Europe.[1] In 1974, after a decade of involvement in the development of tactical ADP systems, the Army Computer Systems Command summarized this experience into six "Lessons Learned."[2] One of these lessons was: A dedicated and trained user is required if tactical ADPS is to succeed.

One approach toward meeting this requirement is to apply techniques derived from modern educational technology and the computer sciences by embedding training subsystem packages within the operating system and then using the system itself to teach the user how to use the system. The approach was delineated in a concept paper,[3] which was subsequently submitted, evaluated and found by key Army Personnel to have merit. As a consequence, a requirement was placed on the Army's Behavior and Systems Research Laboratory (BESRL--the predecessor of what is now the Army Research Institute) by what was then the Assistant Chief of Staff for Force Development (ACSFOR) and the Director of Army Research, Office of the Chief of Research and Development (OCRD),[4,5] to effectuate the research necessary to test the concept.

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[1]Baker, J. D. "Human Factors Experimentation Within a Tactical Operations System (TOS) Environment." Proceedings: Office of Naval Research Sponsored Tri-Service Coordination Meeting, London, England, 20-21 February 1968.

[2]Memorandum from Headquarters, U.S. Army Computer Systems Command to Assistant Deputy Commander, CACDA, Ft. Leavenworth, KA; Deputy Commander, MASSTER, Fort Hood, TX; Project Manager, Army Tactical Data Systems, Fort Monmouth, NJ, dtd 30 January 1974, Subject: TSDG Lessons Learned.

[3]Memorandum from U.S. Army Behavior and Systems Research Laboratory to Assistant Chief of Staff for Force Development, dated 28 September 1971, Subject: Proficiency Maintenance Using Computer-Assisted Instruction in an Operational Setting.

[4]Memorandum from Assistant Chief of Staff for Force Development to Chief of Research and Development, dated 10 November 1971; with 18 November 1971 indorsement to Behavior and Systems Research Laboratory, Subject: Request for Research in Application of Tactical Data Systems for Training.

[5]Memorandum from Chief of Research and Development to Assistant Chief of Staff for Force Development, dated 29 Nov 1971, Subject: Request for Research in Application of Tactical Data Systems for Training.

The terms of the requirement actually levied, however, went well beyond the scope of the original concept and called for a simultaneous attack on all facets of the problem associated with testing the feasibility of the approach. In terms of broadened scope, the primary role of these systems is in support of tactical operations. Our original concept paper suggested a potential, select secondary role for these computerized tactical data systems, viz., that of directly supporting the system user by using the system itself, in a stand-alone mode, to teach the user how to use the system. The agencies structuring the research requirements saw a possible tertiary role for these systems. About the time they were structuring their requirements, the Army's Dynamic Training Board identified the maintenance of proficiency of Military Occupation Specialty (MOS) 11B40, the light weapons infantryman, as a glaring unit training problem and suggested that Computer-Assisted Instruction (CAI) as one technique for alleviating the situation.[6] In addition, a subsequent Continental Army Command (CONARC) Task Group report on CAI identified the 11B40 MOS as a top contender for attention in the "non-technical" skills area.[7] Consequently, the scope of the effort was expanded to encompass an examination of a tertiary role, i.e., in support of the system's parent unit by using these computers to meet individual and unit training requirements such as those associated with the 11B40 MOS. Additionally, in response to concern that the implementation of the Modern Volunteer Army concept might produce a need for general education development (GED) upgrading it was determined that an examination should be made of the feasibility of employing extant CAI GED on tactical computers in an operational setting. The assumption was made that accomplishment of these latter requirements would be tantamount to proving the feasibility of the secondary role concept as well. The test, therefore, would be a cost-effective undertaking since it would provide data directed toward answering a number of diverse questions concerned with a common training delivery system, viz., tactical computers.

Irrespective of whether it was the secondary or tertiary role concept being assessed, four major components were required: a test in a credible operational environment; appropriate hardware; functioning software and representative people-ware. The vehicle for this overall assessment was MASSTER[8] Test FM 122, "IBCS: Automated Instruction." The hardware was a "given" viz., the Developmental Tactical Operations

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[6]Report of the Board for Dynamic Training, Volume II. 17 December 1971, page 116.

[7]Headquarters, United States Continental Army Command Task Group Report and Computer Assisted Instruction. April 1972.

[8]MASSTER - Modern Army Selected Systems Test, Evaluation, and Review--is the Army's test bed for assessing equipment, concepts and doctrine. This activity is located at Fort Hood, Texas.

System (DEVTOS) which was then located at Fort Hood, Texas (Hoyt, et al[9] provide a description of the hardware).  Likewise, the people were a "given"--our student population would be MOS 11B40 personnel drawn from the 2nd Armored Division and 1st Cavalry Division located at Fort Hood. The question of what "software" approach to take (specifically, whether to use an existing student/author language) was key to the success or failure of Test 122.  Clearly, the decision made at this juncture would determine whether we would hit the assigned "test window" in time to conduct the test.  As a related issue, courseware development would largely depend upon the structure of the student/author language selected, so courseware development could not commence until this decision was made. The decision itself had to be correct and timely--and whatever decision was made would undoubtedly be risky.

To add to the difficulty in reaching a decision, it must be realized that it could not be made unilaterally.  Conduct of a test of the complexity of MASSTER Test FM 122 required support from and coordination between a number of different agencies--key among them being mutual cooperation of the organization which had DEVTOS responsibility, the U.S. Army Computer Systems Command (USACSC), and the Army Research Institute (ARI).  A Memorandum of Understanding[10] was drawn up between these two organizations and, as the first USACSC task in this joint undertaking, a MASSTER Test 122 CAI Concept Paper[11] was to provide alternative concepts for implementing automated instruction materials on the DEVTOS in support of MASSTER Test 122.  Concurrent with this effort, a contract was let by ARI with the System Development Corporation (SDC) to develop the courseware (i.e., the instructional materials which would be presented through CAI).  The first task SDC had to accomplish was to provide alternative student/author language alternatives for generating the courseware and to determine which alternative provided the best likelihood of success under the test conditions and time constraints imposed.  In essence, the combined results of these analytic studies were expressed as follows: "At this stage, many alternative design concepts can be formulated. However, due to time constraints on the implementation of any concept, the only alternative concept considered feasible...is the use of PLANIT."[12]

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[9]Hoyt, W. G., Butler, A. K. and Bennik, F. D.  "Application of Tactical Data Systems for Training:  DEVTOS Feasibility Determination and Selection of an Instructional Operating System."  ARI Technical Paper 267, October 1975.

[10]Memorandum of Understanding Between Commander, U.S. Army Research Institute and Commander, U.S. Army Computer Systems Command, Dated 5 June 1973.

[11]Bunker-Ramo Technical Note "MASSTER Test 122--Computer Assisted Instruction (CAI) Concept Paper," February 1973, prepared for the U.S. Army Computer Systems Command.

[12]Ibid. 11, page 18.

PLANIT (Programming Language for Interactive Teaching) is an instructional system consisting of an author language and supporting computer programs for preparing, editing and presenting any subject matter suitable for individualized CAI presentation to students, as well as recording all relevant response data for immediate utilization and subsequent analyses. PLANIT was developed over an eleven year period under the aegis of the National Science Foundation (NSF) at a total investment cost of approximately $740,000. The main goal of this NSF project was to produce a student/author language which would be fully transportable and guaranteed compatible with a large and diversified class of machines.[13] We at ARI take professional pride in the fact that it was our early and subsequent work with PLANIT which validated this visionary transportability notion of NSF.[14] We also take "economic" pride in the fact that we capitalized upon an already "hefty" U.S. Government investment to solve a problem, rather than slipping into the classic mold of "reinventing the wheel" by starting from scratch and building a separate student/author language tailored to the hardware/software system constraints.

To lower the curtain on MASSTER Test FM 122, the test was success-fully conducted and demonstrated that it was feasible to use tactical computers in a stand-alone training mode to satisfy individual and unit training requirements. It was found that automated instruction in a field setting was enthusiastically accepted by the non-commissioned officers (NCO's) examined and, as a training medium, it proved to be more effective than the traditional study-method of training.[15,16,17,18,19]

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[13]Frye, C. H. "A Report on PLANIT: One Stage of Completion," Final Report for the National Science Foundation Grant No. EPP73-07319 A04, August 1975.

[14]For a complete account of the experiences of ARI in installing, using and evaluating PLANIT in an Army setting, including all the "warts and blemishes" uncovered during this endeavor, see: Johnson, C. "Implementation of PLANIT at the U.S. Army Research Institute for the Behavioral and Social Sciences," PLANIT Newsletter, July 1975.

[15]Hoyt, W. G. and Baker, J. D. The use of tactical computers to provide weapons and tactics training to combat NCO's: Results of a field test. Proceedings: Sixteenth Annual Conference of the Military Testing Association MTA, U.S. Coast Guard Institute, Oklahoma City, OK. 21-25 October 1974.

[16]Hoyt, W. G., Butler, A. K. and Bennik, F. D. Application of tactical data systems for training: Volume II - CAI/DEVTOS automation studies. ARI Technical Paper 267, October 1975.

[17]Hoyt, W. G., Butler, A. K. and Bennik, F. D. Application of tactical data systems for training: Volume I - Executive Summary. ARI Technical Paper ___, in preparation.

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But the results of this test proved more than the preceding. They also indicated that the obvious Army needs mentioned at the outset of this preface, could be met by applying this technology to a real and present problem. It also went beyond the exploratory stage and satisfied a specific Army requirement. The U.S. Army Combat Developments Command (CDC)/Systems Analysis Group (now the U.S. Army Training and Doctrine Command/Combined Arms Combat Developments Activity, or TRADOC/CACDA) had levied the following requirement[20] on ARI:

> The Proposed Material Need for the Tactical Operations System - TOS (Unclassified title, portions of contents classified CONFIDENTIAL) states: "During system non-tactical employment the equipment shall have the capability to permit the training of user personnel without affecting the mission ready capability of the system." While the need exists, no specific data are extant which can be brought to bear on this problem. The requested research will provide data which could impact on all TOS users and result in considerable savings in training costs related to the user's need to maintain proficiency in the use of these systems.

The 122 Test data satisfied the CDC requirement. The Proposed Material Need (MN) for TOS was found to be a viable concept and that MN remains to this day as a bonafide component of the TOS program.

As previously discussed, the results from MASSTER Test FM 122 demonstrated the viability of the embedded training subsystem concept in general and that tactical data systems could be used in a tertiary role, i.e., specifically, that these systems could be used in a stand-alone mode in support of individual and unit softskills training requirements. But conceptually our main goal had always been to embed system specific training packages within the operating system itself and then to use the system to teach the user how to use the system--the earlier noted secondary role for these systems.

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[18] Hoyt, W. G., Butler, A. K. and Bennik, F. D. Application of tactical data systems for training: Volume III - Development of courseware and analysis of results for MOS 11B40. ARI Technical Paper ___, in preparation.

[19] Hoyt, E. G., Butler, A. K. and Bennik, F. D. Application of tactical data systems for training: Volume IV - Development of courseware and analysis of results for GED math. ARI Technical Paper ___, in preparation.

[20] Letter, DARB-ARB 19 July 1972, Subject: New Research Requirements for the Human Resources Research and Development Program (RCS CSCRD 70 CRI); letter response from CDCSAG-AG1, same subject as above, dated 1 September 1972.

As a follow-on to Test 122, research was initiated under the aegis of the Product Manager, Computer Training Systems (PM CTS) through HRN 75-158 (and, subsequently, HRN 76-195) which tasked ARI to address the problem of reducing the novice user's difficulties by making tactical data systems (e.g., $TOS^2$, TACFIRE, TSQ-73, etc.) more "approachable" through applications of the embedded training concept.[21]

Because of its stage of development, the fact that its basic central processing unit would serve as the core for other Army Tactical Data Systems (ARTADS) to follow, and the fact that its operator training problems appeared to be amenable to reduction through the application of automated instructional technology, TACFIRE (the Army's field artillery tactical fire control system) was chosen by the PM CTS as the test vehicle for assessing the embedded training subsystems concept. The initial and specific requirements for the TACFIRE research were delineated in HRN 76-193, "Development and Evaluation of PLANIT Based Computer Embedded Training Packages for TACFIRE" which was prepared by personnel of the U.S. Army Field Artillery School, Fort Sill, OK.

Once again we were faced with the dilemma as to whether the best decision would be to develop a tailor-made student/author language smoothly fitted to the hardware/software constraints of the TACFIRE system, or to build upon our already successfully operating PLANIT system and attempt to install it on TACFIRE. The latter approach had many merits, among them: (1) it was an author language system with which we were familiar, while a customized system would be untested, costly and would require an extensive checkout; (2) a customized authoring system would be limited to a given TACFIRE configuration, whereas PLANIT would be transportable to the family of ARTADS systems, and (3) because of PLANIT's machine independent characteristics, courseware could be prepared on commercial computers and, after content checkout, easily installed on the tactical system, whereas a customized approach would tie-up the actual tactical system during courseware preparation.

The effort to install PLANIT on the AN/GYK-12 computer, the results of which are contained in this set of reports, was independently undertaken as Technology Based - Exploratory Development research and not as Advanced Development activity (i.e., it was not done in direct response to an explicit, stated user need). It serves as a classic example of what Dr. Malcolm R. Currie, Director of Defense Research and Engineering (DDR&E) was describing in the following statement to the Second Session of the 94th Congress: "The objective of the Technology Base is the advancement of technology applicable to future systems and subsystem

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[21]Human Resource Need (HRN) 75-158, title: "User Training and Proficiency Maintenance in a Tactical Data Systems Environment," submitted as a research requirement for inclusion in the ARI FY 75 Advanced Development Work Program by the Product Manager, Computerized Training System, Fort Monmouth, NJ. HRN 76-195 was a revalidation of the requirements delineated in 75-158 for inclusion in the FY 76 Work Program.

options. These options (or new ideas) usually involve enhanced military capability, reduced cost, increased performance, better reliability and maintainability, more efficient use of resources or some combination of these attributes." Success in this effort would produce a broadly applicable, cost-effective vehicle for employing embedded training subsystem packages in a variety of military system settings.

It merits comment, however, that while this work was a Technology Based-Exploratory Effort, it had the potential for feeding into the Advanced Development program efforts associated with the user tasks presented in HRN 75-158, "User Training and Proficiency Maintenance in a Tactical Data Systems Environment," if the outcome were successful. Consequently, the PM-CTS was appraised of this effort at the outset and he, in turn, coordinated it with the Program Manager, Army Tactical Data Systems (PM ARTADS). During this coordination some valid points of criticism were raised[22] concerning the PLANIT approach. The PM ARTADS recommended that ARI meet with system developers, users and training agencies as soon as sufficient data were available to determine whether, or not, PLANIT would operate on TACFIRE. At that time a determination would be made concerning implementation implications and to assess if, indeed, this were the most effective approach to take, given the potential for impact on TACFIRE system development efforts. In keeping with this recommendation, a Workshop was convened at ARI in Arlington, VA on 1 October 1974 and these items were covered in detail with personnel from all of the suggested groups in attendance. The interaction was found to be most beneficial to all concerned and the concensus of the group was to install the system described in this set of reports on the TACFIRE system at Fort Sill, OK, and to use it as the test vehicle for assessing the embedded training concept on that ARTADS system.

This historic overview of the events leading up to the production of the set of quite specialized reports may seem untoward in view of the projected, limited set of users of these documents. It is, however, a quite meaningful forum for discussing these events. Too frequently the question is raised as to how did a particular research product originate and was it utilized. The intent here is to show that the warp and woof of concepts and coordination, requirements and research are so intertwined that a simple one-to-one relationship (one response, one use) does not tell the story—only a view of the whole cloth will put it into proper perspective. Additionally, it exemplifies a point made in the previously cited presentation by the Director of Defense Research and Engineering to the 94th Congress when he said: "To deploy systems DOD must not only pursue advanced technology but must endure the long years of research required to bring an idea through growth problems to a finished, proven and useful end product."

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[22]Memorandum from Product Manager, Computer Training Systems (PM-CTS) to Program Manager, Army Tactical Data Systems (PM-ARTADS) 28 Jan 74, Subject: HRN 75-158 and 1st indorsement from PM-ARTADS to PM-CTS, same subject as above dated 7 February 74.

This set of reports provides detailed instructions for implementation and operation of PLANIT and auxiliary programs on the AN/GYK-12 computer. The set consists of a report on:

- o TRANSL - The PLANIT Translator Program: Installation and Application

- o PLANIT Support Programs - Operator/user manual

- o PLANIT Utility Program - Operator/user manual

- o PLANIT Support and Utility Programs - Test Procedure

- o PLANIT Support and Utility Programs - Flow Charts.

The first report contains the information for installing and operating a program which is designed to translate the FORTRAN from the PLANIT system of programs into the TACPOL language for compilation on the AN/GYK-12 computer. The second covers the general and specific aspects of leading and operating PLANIT on the AN/GYK-12 computer. The third document covers the general and specific aspects of operating the PLANIT utility programs which are a specialized group of routines developed to accomplish various tasks in support of the AN/GYK-12 computer installation of PLANIT. The fourth report covers the procedures used to verify that PLANIT Support and Utility Programs are functioning as per specifications. The fifth document provides the detailed flow charts of the computer logic of the PLANIT Support and Utility Programs.

The effort detailed in the first report (i.e., TRANSL) was accomplished under ARI Contract DAHC19-74-C-0038 by the Northwest Regional Educational Laboratory, Portland, Oregon. The other four reports in the series were prepared by the Data Systems Division, Litton Systems Inc., Van Nuys, CA under ARI Contract No. DAHC19-74-C-0064.

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## SECTION 1

## INTRODUCTION

### 1.1  Scope

This manual covers the general and specific aspects of using and operating the PLANIT Support Programs.  These programs are a part of the overall AN/GYK-12 computer PLANIT installation and provide the required equipment and operator interface routines to interface PLANIT with the AN/GYK-12 computer and related peripheral devices and user terminals.

### 1.2  Manual Organization

This manual has been organized in procedural/sequence of operations scenario format as an aid to understanding the use and operation of the PLANIT Support Programs.  The sections of the manual have been ordered in the same sequence that a user would normally encounter the individual program modules, procedures and operational sequences.  The information covered in each section is briefly summarized below:

a.  Section 1:  This section provides general and background information related to the overall AN/GYK-12 PLANIT system installation.

b.  Section 2:  POS/RAMCHECK program modules procedures and operational sequences encountered during PLANIT system initialization.  This section specifically identifies the messages, error indicators and procedures to be utilized during system initialization.

c.  Section 3:  START program module procedures and operational sequences encountered during PLANIT system initialization.  This section specifically identifies the messages, error indications and procedures to be utilized during system initialization after the POS/RAMCHECK initialization sequences have been completed.

d.  Section 4:  MIOP/TMIOP program modules procedural and operational sequences encountered during PLANIT system initialization and PLANIT operation.  This section specifically identifies the messages, error indications and procedures to be utilized during system initialization and system operations involving MIOP and TMIOP.

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e. Section 5: FINAL program module procedures and operational sequences encountered during PLANIT system termination operations. This section specifically identifies the messages, error indications and procedures to be utilized during PLANIT system termination.

f. Appendix A: Diagnose Status Codes summary. This section lists in numerical order and describes the meaning of Diagnose Status Codes (DIG Codes) output to the CPU DIG lights by the PLANIT Support Programs.

g. Appendix B: ACC/OCC operating procedures. This section identifies the specific operator/author/student operating procedures associated with the ACC and OCC terminals.

h. Appendix C: MIOD operating procedures. This section identifies the specific operator/author/student operating procedures associated with the MIOD terminal.

i. Appendix D: VFMED operating procedures. This section identifies the specific operator/author/student operating procedures associated with the VFMED terminal.

j. Appnedix E: PLANIT character sets. This section summarizes the character differences between: 1.) the TACFIRE (and $TOS^2$) ASCII and EBCDIC character sets, 2.) the ARI CDC 3300 character set, and 3.) the ARI Univac 1108 character set.

k. Appendix F: PLANIT cards file. This section provides a listing of the cards file for the version 2.6 PLANIT system used in the AN/GYK-12 PLANIT installation.

l. Appendix G: PLANIT map. This section provides a listing of the PLANIT map for the version 2.6 PLANIT system used in the AN/GYK-12 PLANIT installation.

m. Appendix H: TACFIRE/$TOS^2$ equipment pictures. This section provides a set of pictures of the TACFIRE and $TOS^2$ equipment items most frequently used during operation of the AN/GYK-12 PLANIT system.

n. Appendix I: Glossary of terms. This section provides a glossary of terms and mnemonics used throughout the PLANIT support and utility programs manuals and related documentation.

## 1.3 General Information

The AN GYK-12 PLANIT system installation utilizes the basic PLANIT version 2.6 generated with the AN/GYK-12 computer and system parameters and then translated from FORTRAN to TACPOL. The resulting nine program modules (PLANIT MAIN and PLAN1 through PLAN8 overlays) are compiled along with the PLANIT Support Programs (described in this manual) and integrated into the object and load tapes using the PLANIT Utility Program (PUP). All compilations were performed using the TACFIRE PSSB Compiler (version 3.4). In addition to this manual and the individual program listings, detailed information on the operation and use of the AN/GYK-12 PLANIT System can be found in the following documents:

> PLANIT Utility Program Operator/User Manual
>
> (Litton Document No. 125201-900)
>
> PLANIT Support and Utility Programs Flow Charts
>
> (Litton Document No. 125202-950)
>
> PLANIT Author's Guide [SDC Document No. TM-(L)-4422/001/01]
>
> PLANIT Language Reference Manual [SDC Document No. TM-(L)-4422/002/01]
>
> Document Update Information for PLANIT, Version 2.0
>
> (Northwest Regional Educational Laboratory document)

The PLANIT Utility Program (PUP) Operator/User Manual provides a detailed description of the procedures and operational sequences for use of the PUP routines for such support tasks as preparation of PLANIT load tapes or cartridges, field history/lesson tapes and cartridges, object library updates, and processing of PLANIT translation tapes.

The PLANIT Support and Utility Programs Flow Charts document provides an overview of the AN GYK-12 PLANIT System functional interfaces and the detailed flow charts of the support programs and utility routines.

The PLANIT Author's Guide, Language Reference Manual and Document Update Information provide the information required for the application and use of PLANIT itself. In addition, supplementary information on the AN/GYK-12 PLANIT is provided in Appendix F (character set), Appendix G (PLANIT cards file), and Appendix H (PLANIT map) of this manual.

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## 1.4 Special Considerations

The basic (commercial computer) PLANIT system is written in a meta FORTRAN and uses the floating point, trig functions and other special features of the FORTRAN language. The AN/GYK-12 computer and its TACPOL language uses fixed point arithmetic and display buffers of 520 terminal output characters. The translation of PLANIT from FORTRAN to TACPOL results in certain special considerations in the operation and use of the AN/GYK-12 PLANIT system. These special considerations are described below:

a. The display format is 72 characters per line (plus carriage return/line feed) by 7 lines. The top line is used for special MIOP messages or is blank for entering answers. Thus a single PLANIT display output segment is 6 lines (up to 72 characters per line). This is a fixed (non-scrolling) display output, i. e., a frame of 21 output lines of data in PLANIT will result in 3 display outputs of 6 lines followed by a display output of 3 lines (plus a top blank line for response if applicable).

b. The PLANIT/MIOP display buffer is 520 terminal output characters in the current immplementation. For display outputs of greater than 520 terminal output characters (such as printing a large segment of a lesson to the display). The output will result in a splitting of a line (partial line printed followed by rest of line printed on next line of the display) after each 520 terminal output character increment. This does not affect the output to other peripheral devices such as the card reader or punch, printer, tape units, etc.

c. 62,15 [DCL X (62,15)] notation was used in the majority of the cases of conversion from the FORTRAN floating point arithmetic to the TACPOL fixed point arithmetic (scientific notation was used in some instances). The selection of 62,15 results in up to four (4) decimal place numbers.

d. The 62,15 notation and the single word precision used in the TACPOL library functions (such as SQRT, LOG, LN, etc.) results in a limitation to a maximum value of $2^{15}$ for input to these functions.

e. Since TACPOL does not include fractional exponentation, only integer powers may be used. The base number may be fractional (e. g., $(3.1416)^5$].

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f.  The limitation of 4 place (decimal) numbers, e. g., XX.XXXX, in
    the current implementation restricts the use and decimal accuracy
    of CALC statements and answers.  Certain combinations of math
    statements may result in a degree of error in the decimal portion
    of the resulting answer.  For example, XX.XXX times YY.YY implies
    five place accuracy in the calculation and will result in a degree
    of error in the resulting decimal portion of the answer.  On the
    other hand XX.XXX times YY.Y implies four place accuracy and will
    yield a correct answer.  Similarly certain functions such as SQRT
    (square root) may yield a degree of error in the decimal portion
    of the answer.  Integer arithmetic is not affected by this limita-
    tion.

    This does imply the need to use the WITHIN expression for answer
    matching within lessons in cases where the decimal portion of the
    answer may be affected by this limitation in the current implement-
    ation.

## SECTION 2

### POS/RAMCHECK PROCEDURES/SEQUENCE OF OPERATIONS

This section describes the procedures, sequence of operations, messages and error indications during loading of the POS and RAMCHECK modules and the POS initialization process. The description and procedures are repeated for each of the current AN/GYK-12 system configurations as follows:

> Subsection 2.1 - TACFIRE Field Configurations
> (Division or Battalion)
>
> Subsection 2.2 - TOS$^2$ Field Configurations
> (Division or Brigade)
>
> Subsection 2.3 - TACFIRE PSSB Configurations
> (Division or Battalion)
>
> Subsection 2.4 - TOS$^2$ SSS Configurations
> (Division or Brigade)

Descriptions and operator actions are included for the DIAGNOSE STATUS (DIG) Codes which may occur during each procedure/sequence of operations. A summary of all DIG Codes and their meaning is included in Appendix A.

Subsection 2.5 describes the meanings of the TEST SWITCH settings during system loading so that a user can determine the TEST SWITCH setting to be used if loading on other than the standard configuration TACFIRE or TOS$^2$ system.

Subsection 2.6 describes the meanings of the TEST SWITCH settings after system loading which in conjunction with the COMPUTER RESTART pushbutton allow the TAPE, CARD and PRINTER devices to be changed from the field devices to the PSS/SSS devices and vica versa. This allows a PSS/SSS center to more easily prepare tapes for field use.

## 2.1 PLANIT SYSTEM SET-UP AND LOADING PROCEDURE FOR TACFIRE FIELD CONFIGURATION

A. Set ACC ADDRESS Switches on the IOU to the ACC switch assembly device address (25).

B. Set the DATA EXCHANGE CHANNEL SELECT switches (IOU Maintenance and Status Panel) A, B and C = 1, 2 and 3 respectively.

C* Insure a minimum of two drums on-line (one drum can be used with load/history tape with a modified " cards file" file allocation).

D. Set all 8K Memory Banks to off-line.

E. Set MCMU BANK ADDRESS switches = 00 (if more than one; 00, 01, 02, etc.)

F. Mount PLANIT LOAD MLU on ARMM1.

G. Set TEST Switches on IOU Maintenance and Status Panel = 00, 20 if 192 track drums. See 2.5 for non-standard configuration.

H. Depress CHANNEL 11 Program Load Switch on the IOU Maintenance and System Panel. This action will bootstrap load the PLANIT Operating System. If the loading operation is successful, the DIAGNOSE STATUS Lights will display 777201 and System Initialization will begin.

I. During the execution of the System Initialization Phase, certain errors may occur which will display any of the following DIAGNOSE STATUS Codes. The appropriate operator action for each code is indicated.

| DIAGNOSE CODE | OPERATOR ACTION |
| --- | --- |
| 776300 | Rewind system tape and return to step H. |
| 776301 | Rewind system tape and return to step H. |
| 776302 | Rewind system tape and return to step H. |
| 776303 | Check setting of ACC Switches (step A), rewind system tape and return to step H. |
| 776304 | Check setting of TEST switches (step G), rewind system tape and return to step H. |
| 776310 | Check ACC Switch setting (step A), rewind system tape and return to step H. |

* This step is omitted if the system's Memory Configuration consists of three or more MCMUs.

| DIAGNOSE CODE | OPERATOR ACTION |
|---|---|
| 771700 | Rewind system tape and return to step A. |

J.   The PRIORITY MESSAGE Light on the ACC Switch Assembly should be illuminated within 5 seconds following step I. If it is not, depress the LAMP TEST Switch on the Switch Assembly. If the light is inoperative, replace and continue with step K. If the lamp is operating, check the DIAGNOSE STATUS Display for one of the codes listed in step I.

K.   Depress the ACC PRIORITY MESSAGE Switch.

L.   The light associated with the PRIORITY MESSAGE Switch is extenguished and a listing of all peripheral devices and their device addresses will be displayed on the Compose/Edit Display as follows:

CTUO/ARMM1:1/1; CTU1/ARMM2:3/6; CTU2:O/O; CTU3:O/O; RAM:1/O;
DDTAI:2/O; DDTAO:2/1; DDTBI:3/O; DDTBO:3/1; DDTCI:1/2; DDTCO:1/3;
DDTDI:2/2; DDTDO:2/3; DDTEI:1/4; DDTEO:1/5; DDTFI:1/6; DDTFO:1/7;
DDTGI:3/4; DDTGO:3/5; DDTHI:O/O; DDTHO:O/O;
ACCRD:2/6; ACCSA:2/5; ACCCED:2/4;
ELP1:3/3; ELP2:2/7; CARD READER:O/O; CARD PUNCH:O/O; H-S PRINTER:O/O;

In the absence of a display, the following DIAGNOSE STATUS Code will appear:

| DIAGNOSE CODE | OPERATOR ACTION |
|---|---|
| 771200 | Check for "POWER ON" on Compose/Edit Display Module, rewind system tape and return to step H. |

M.   If no device address changes are desired, go to step O.

N.   Device address changes are effected as follows:
Each device address is displayed in the form of two octal digits separated by a slash (/). Activation of the tab key will position the cursor to the first digit of each address in turn. Thus positioned, either or both digits may be altered by entering the desired octal digit from the keyboard. The two digits represent the primary and secondary IOU channels assigned/cabled to the device. O/O designates the device is off-line or not used.

2-3

O.   After entering changes (if any), depress the CURSOR RESET Key, then
     depress the XMIT Key to store the device addresses displayed
     and to print a hard copy of the Device Address Assignments (if
     ELP 1 is on-line). System malfunction at this time will result in
     the display of one of the following DIAGNOSE STATUS Codes:

| DIAGNOSE CODE | OPERATOR ACTION |
|---|---|
| 771201 | Rewind system tape and return to step H.  Do not enter device address whose octal value is less than 6 or greater than 77. |
| 771202 | No operator action required. |
| 771701 | Rewind system tape and return to step H. |

P. *  The second program on the system tape (RAMCHECK) will be loaded
      next and executed.  Possible errors associated with this or sub-
      sequent program loads will result in the display of the following
      DIAGNOSE STATUS Codes:

| DIAGNOSE CODE | OPERATOR ACTION |
|---|---|
| 774000 | Recheck step B and G.  Rewind system tape and return to step H. |
| 774005 | Rewind system tape and return to step H. |
| 776305 | Recheck step G.  Rewind system tape and return to step F. |
| 776306 | Rewind system tape and return to step C. |

Q. *  Execution of RAMCHECK will terminate with the display of one of
      the following DIAGNOSE STATUS Codes:

      0540XX    (XX= # Drums on-line) - Drums are operational and
                program has advanced to step R.

      056001-056020   Non-recoverable error.  Rewind system tape
                      and return to step H.

R.    The remaining programs on the system tape are now being loaded.
      Errors which may occur during loading and subsequent storage will
      be displayed as the following DIAGNOSE STATUS Codes:

| DIAGNOSE CODE | OPERATOR ACTION |
|---|---|
| 774001 | Rewind system tape and return to step H. |
| 774002 | Rewind system tape and return to step H. |

* This step is omitted if the system's Memory Configuration con-
  sists of three or more MCMUs.

| DIAGNOSE CODE | OPERATOR ACTION |
|---------------|-----------------|
| 774003 | Rewind system tape and return to step H. |
| 774004 | Rewind system tape and return to step H. |
| 774005 | Rewind system tape and return to step H. |
| 774006 | Rewind system tape and return to step H. |

S.    Successful conclusion of step R results in the execution of
the "START" program which requires prompted inputs from the ACC
Terminal Keyboard. System initialization and loading has been con-
pleted.

ADDITIONAL DIAGNOSE STATUS CODES WHICH MAY APPEAR DURING PLANIT
EXECUTION ARE AS FOLLOWS:

| DIAGNOSE CODE | MEANING | OPERATOR ACTION |
|---|---|---|
| 770000 | A NON-IMPLEMENTED PROGRAM LEVEL HAS BEEN REQUESTED. | DEPRESS MASTER RESET SWITCH. |
| 7713XX | XMIT CHANNEL (LEVEL 13) ERROR ON DDT XX (XX = 0-7 FOR DDT A-H). | NONE. |
| 7715XX | RECEIVE CHANNEL (LEVEL 15) ERROR ON DDT XX (XX = 0-7 FOR DDT A-H). | NONE |
| 772000 | RAM READ ERROR DURING OVERLAY CALL. | DEPRESS MASTER RESET SWITCH. |
| 770100 | UNABLE TO RESTART CLOCKS DURING HOT START. | RETURN TO STEP H |
| 770200 | DEVICE TIMEOUT OR PARITY ERROR DURING ITR TO MONITOR REGISTER. | DEPRESS MASTER RESET SWITCH. |
| 77XX17 | A TRAP CONDITION OCCURRED IN LEVEL XX (CAUSED BY NON-IMPLEMENTED INSTRUCTION OR ARITHMETIC OVERFLOW). | DEPRESS MASTER RESET SWITCH |
| 776307 | ALL PROGRAM LEVELS EXCEPT LEVEL 63 ARE INACTIVE OR A PERIPHERAL DEVICE WAS EXERCISED WITHOUT PROPER PREPARATION OF KEY AND TERM WORDS. | **DEPRESS MASTER RESET SWITCH** |

## 2.2 PLANIT SYSTEM SET-UP AND LOADING PROCEDURE FOR TOS$^2$ FIELD CONFIGURATION

A. Set ACC ADDRESS Switches on the IOU to the OCC switch assembly device address (35).

B. Set the DATA EXCHANGE CHANNEL SELECT switches (IOU Maintenance and Status Panel) A, B and C = 1, 2 and 3 respectively.

C. Insure a minimum of two drums on-line.

D. Mount PLANIT LOAD Tape on Potter Drive #1 (800 BPI tape).

E. Set TEST Switches on IOU Maintenance and Status Panel = 11. See 2.5 for non-standard configuration.

F. Depress CHANNEL 11 Program Load Switch on the IOU Maintenance and Status Panel. This action will bootstrap load the PLANIT Operating System. If the loading operation is successful, the DIAGNOSE STATUS Lights will display 777201 and System Initialization will begin.

G. During the execution of the System Initialization Phase, certain errors may occur which will display any of the following DIAGNOSE STATUS Codes. The appropriate operator action for each code is indicated.

| DIAGNOSE CODE | OPERATOR ACTION |
|---|---|
| 776300 | Rewind system tape and return to step F. |
| 776301 | Rewind system tape and return to step F. |
| 776302 | Rewind system tape and return to step F. |
| 776303 | Check setting of ACC Switches (step A), rewind system tape and return to step F. |
| 776304 | Check setting of TEST switches (step E), rewind system tape and return to step F. |
| 776310 | Check ACC Switch setting (step A), rewind system tape and return to step F. |
| 771700 | Rewind system tape and return to step A. |

H.  The PRIORITY MESSAGE Light on the OCC Switch Assembly should be illuminated within 5 seconds following step G. If it is not, depress the LAMP TEST Switch on the Switch Assembly. If the light is inoperative, replace and continue with step I. If the lamp is operating, check the DIAGNOSE STATUS Display for one of the codes listed in step G.

I.  Depress the OCC PRIORITY MESSAGE Switch.

J.  The light associated with the PRIORITY MESSAGE Switch is extenguished and a listing of all peripheral devices and their device addresses will be displayed on the Compose/Edit Display as follows:

CTUO/ARMM1:1/1; CTU1/ARMM2:1/1; CTU2:1/1; CTU3:1/1; RAM:1/0;
DDTAI:2/0; DDTAO:2/1; DDTBI:2/2; DDTBO:2/3; DDTCI:2/4; DDTCO:2/5;
DDTDI:2/6; DDTDO:2/7; DDTEI:1/4; DDTEO:1/5; DDTFI:1/6; DDTFO:1/7;
DDTGI:1/2; DDTGO:1/3; DDTHI:3/0; DDTHO:3/1;
ACCRD:3/6; ACCSA:3/5; ACCCED:3/4;
ELP1:3/3; ELP2:0/0; CARD READER:0/0; CARD PUNCH:0/0; H-S PRINTER:0/0;

In the absence of a display, the following DIAGNOSE STATUS Code will appear:

| DIAGNOSE CODE | OPERATOR ACTION |
| --- | --- |
| 771200 | Check for "POWER ON" on Compose/Edit Display Module, rewind system tape and return to step F. |

K.  If no device address changes are desired, go to step M.

L.  Device address changes are effected as follows:
    Each device address is displayed in the form of two octal digits separated by a slash (/). Activation of the tab key will position the cursor to the first digit of each address in turn. Thus positioned, either or both digits may be altered by entering the desired octal digit from the key-board.

M.  After entering changes (if any), depress the CURSOR RESET Key, then depress the XMIT Key to store the device addresses displayed and to print a hard copy of the Device Address Assignments (if ELP 1

is on-line). System malfunction at this time will result in the display of one of the following DIAGNOSE STATUS Codes:

| DIAGNOSE CODE | OPERATOR ACTION |
| --- | --- |
| 771201 | Rewind system tape and return to step F. Do not enter device address whose octal value is less than 6 or greater than 77. |
| 771202 | No operator action required. |
| 771701 | Rewind system tape and return to step F. |

N. The second program on the system tape (RAMCHECK) will be loaded next and executed. Possible errors associated with this or subsequent program loads will result in the display of the following DIAGNOSE STATUS Codes:

| DIAGNOSE CODE | OPERATOR ACTION |
| --- | --- |
| 774000 | Recheck steps B and E. Rewind system tape and return to step F. |
| 774005 | Rewind system tape and return to step F. |
| 776305 | Recheck step E. Rewind system tape and return to step F. |
| 776306 | Rewind system tape and return to step C. |

O. Execution of RAMCHECK will terminate with the display of one of the following DIAGNOSE STATUS Codes:

0540XX  (XX= # Drums on-line) - Drums are operational and
program has advanced to step P.

056001-056020   Non-recoverable error. Rewind system tape and
return to step F.

P. The remaining programs on the system tape are now being loaded. Errors which may occur during loading and subsequent storage will be displayed as the following DIAGNOSE STATUS Codes:

| DIAGNOSE CODE | OPERATOR ACTION |
| --- | --- |
| 774001 | Rewind system tape and return to step F. |
| 774002 | Rewind system tape and return to step F. |
| 774003 | Rewind system tape and return to step F. |

| DIAGNOSE CODE | OPERATOR ACTION |
| --- | --- |
| 774004 | Rewind system tape and return to step F. |
| 774005 | Rewind system tape and return to step F. |
| 774006 | Rewind system tape and return to step F. |

Q.  Successful conclusion of step P results in the execution of the "START" program which requires prompted inputs from the OCC Terminal Keyboard. System initialization and loading has been completed.

ADDITIONAL DIAGNOSE STATUS CODES WHICH MAY APPEAR DURING PLANIT
EXECUTION ARE AS FOLLOWS:

| DIAGNOSE CODE | MEANING | OPERATOR ACTION |
|---|---|---|
| 770000 | A NON-IMPLEMENTED PROGRAM LEVEL HAS BEEN REQUESTED. | DEPRESS MASTER RESET SWITCH. |
| 7713XX | XMIT CHANNEL (LEVEL 13) ERROR ON DDT XX (XX = 0-7 for DDT A-H). | NONE. |
| 7715XX | RECEIVE CHANNEL (LEVEL 15) ERROR ON DDT XX (XX = 0-7 for DDT A-H). | NONE |
| 772000 | RAM READ ERROR DURING OVERLAY CALL. | DEPRESS MASTER RESET SWITCH. |
| 770100 | UNABLE TO RESTART CLOCKS DURING HOT START. | RETURN TO STEP F. |
| 770200 | DEVICE TIMEOUT OR PARITY ERROR DURING ITR TO MONITOR REGISTER. | DEPRESS MASTER RESET SWITCH. |
| 77XX17 | A TRAP CONDITION OCCURRED IN LEVEL XX (CAUSED BY NON-IMPLEMENTED INSTRUCTION OR ARITHMETIC OVERFLOW). | DEPRESS MASTER RESET SWITCH |
| 776307 | ALL PROGRAM LEVELS EXCEPT LEVEL 63 ARE INACTIVE OR A PERIPHERAL DEVICE WAS EXERCISED WITHOUT PROPER PREPARATION OF KEY AND TERM WORDS. | DEPRESS MASTER RESET SWITCH |

## 2.3 PLANIT SYSTEM SET-UP AND LOADING PROCEDURE FOR TACFIRE PSSB CONFIGURATION

A. Set ACC ADDRESS Switches on the IOU to the ACC switch assembly device address (25).

B. Set the DATA EXCHANGE CHANNEL SELECT switches (IOU Maintenance and Status Panel)    B and C = 1, 2 and 3 respectively.

C.* Insure a minimum of two drums on-line.

D. Set all 8K Memory Banks to off-line.

E. Set MCMU BANK ADDRESS switches = 00 (if more than one;  00, 01, 02, etc.)

F. Mount PLANIT LOAD Tape on IBM Tape Drive 0, 1, 2 or 3.

G. Set TEST switches on IOU Maintenance Panel to one of the following values:

      02 if tape is mounted on Unit 0, 22 if 192 track drums.
      03 if tape is mounted on Unit 1, 23 if 192 track drums.
      04 if tape is mounted on Unit 2, 24 if 192 track drums.
      05 if tape is mounted on Unit 3, 25 if 192 track drums.
      See 2.5 for non-standard configuration.

H. If the cards file is to be entered via the Card Reader, place cards in input hopper and start Card Reader.

I. Set INSTRUCTION STOP and press MASTER CLEAR on Computer Test Set.

J. Set PEBU CHANNEL SELECT switch to 1 and BSL SELECT switch to the TU0-TU3 setting which corresponds to the tape drive selected for system load.

K. Depress the PEBU Load switch to Bootstrap Load the PLANIT Operating System from the System Tape.  If the load is successful, the computer will halt and the DIAGNOSE STATUS Lights will display 777201.  If the load is unsuccessful, rewind the System Tape and return to step I.

---

\* This step is omitted if the system's Memory Configuration consists of three or more MCMUs.

L. Set the PEBU CHANNEL SELECT switch to 7.

M. Release the INSTRUCTION STOP Switch and press the COMPUTER START Switch. This action will start system initialization.

N. During the execution of the System Initialization Phase, certain errors may occur which will display any of the following DIAGNOSE STATUS Codes. The appropriate operator action for each code is indicated.

| DIAGNOSE CODE | OPERATOR ACTION |
| --- | --- |
| 776300 | Rewind system tape and return to step I. |
| 776301 | Rewind system tape and return to step I. |
| 776302 | Rewind system tape and return to step I. |
| 776303 | Check setting of ACC Switches (step A), rewind system tape and return to step I. |
| 776304 | Check setting of TEST switches (step G), rewind system tape and return to step I. |
| 776310 | Check ACC Switch setting (step A), rewind system tape and return to step I. |
| 771700 | Rewind system tape and return to step A. |

O. The PRIORITY MESSAGE Light on the ACC Switch Assembly should be illuminated within 5 seconds following step N. If it is not, depress the LAMP TEST Switch on the Switch Assembly. If the light is inoperative, replace and continue with step P. If the lamp is operating, check the DIAGNOSE STATUS Display for one of the codes listed in step N.

P. Depress the ACC PRIORITY MESSAGE Switch.

Q. The light associated with the PRIORITY MESSAGE Switch is extenguished and a listing of all peripheral devices and their device addresses will be displayed on the Compose/Edit Display as follows:

CTU0/ARMM1:7/0; CTU1/ARMM2:7/1; CTU2:7/2; CTU3:7/3; RAM:1/0;
DDTAI:2/0; DDTAO:2/1; DDTBI:3/0; DDTBO:3/1; DDTCI:1/2; DDTCO:1/3;
DDTDI:2/2; DDTDO:2/3; DDTEI:1/4; DDTEO:1/5; DDTFI:1/6; DDTFO:1/7;
DDTGI:3/4; DDTGO:3/5; DDTHI:3/6; DDTHO:3/7;
ACCRD:2/6; ACCSA:2/5; ACCCED:2/4;
ELP1:3/3; ELP2:2/7; CARD READER:7/4; CARD PUNCH:7/5; H-S PRINTER:7/6;

In the absence of a display, the following DIAGNOSE STATUS Code
will appear:

| DIAGNOSE CODE | OPERATOR ACTION |
| --- | --- |
| 771200 | Check for "POWER ON" on Compose/Edit Display Module, rewind system tape and return to step I. |

R. If no device address changes are desired, go to step T.

S. Device address changes are effected as follows:

Each device address is displayed in the form of two octal
digits separated by a slash (/). Activation of the tab key
will position the cursor to the first digit of each address
in turn. Thus positioned, either or both digits may be
altered by entering the desired octal digit from the key-
board.

T. After entering changes (if any), depress the CURSOR RESET Key, then
depress the XMIT Key to store the device addresses displayed
and to print a hard copy of the Device Address Assignments (if
ELP 1 is on-line). System malfunction at this time will result in
the display of one of the following DIAGNOSE STATUS Codes:

| DIAGNOSE CODE | OPERATOR ACTION |
| --- | --- |
| 771201 | Rewind system tape and return to step I. Do not enter device address whose octal value is less than 6 or greater than 77. |
| 771202 | No operator action required. |
| 771701 | Rewind system tape and return to step I. |

U. * The second program on the system tape (RAMCHECK) will be loaded
next and executed. Possible errors associated with this or sub-
sequent program loads will result in the display of the following
DIAGNOSE STATUS Codes:

| DIAGNOSE CODE | OPERATOR ACTION |
| --- | --- |
| 774000 | Recheck step B and G. Rewind system tape and return to step I. |
| 774005 | Rewind system tape and return to step I. |

| DIAGNOSE CODE | OPERATOR ACTION |
| --- | --- |
| 776305 | Recheck step G. Rewind system tape and return to step I. |
| 776306 | Rewind system tape and return to step C. |

V.* Execution of RAMCHECK will terminate with the display of one of the following DIAGNOSE STATUS Codes:

0540XX (XX= # Drums on-line) – Drums are operational and program has advanced to step W.

056001-056020 Non-recoverable error. Rewind system tape and return to step I.

W. The remaining programs on the system tape are now being loaded. Errors which may occur during loading and subsequent storage will be displayed as the following DIAGNOSE STATUS Codes:

| DIAGNOSE CODE | OPERATOR ACTION |
| --- | --- |
| 774001 | Rewind system tape and return to step I. |
| 774002 | Rewind system tape and return to step I. |
| 774003 | Rewind system tape and return to step I. |
| 774004 | Rewind system tape and return to step I. |
| 774005 | Rewind system tape and return to step I. |
| 774006 | Rewind system tape and return to step I. |

X. Successful conclusion of step W results in the execution of the "START" program which requires prompted inputs from the ACC Terminal Keyboard. System initialization and loading has been completed.

---

* This step is omitted if the system's Memory Configuration consists of three or more MCMUs.

ADDITIONAL DIAGNOSE STATUS CODES WHICH MAY APPEAR DURING PLANIT
EXECUTION ARE AS FOLLOWS:

| DIAGNOSE CODE | MEANING | OPERATOR ACTION |
|---|---|---|
| 770000 | A NON-IMPLEMENTED PROGRAM LEVEL HAS BEEN REQUESTED. | DEPRESS MASTER RESET SWITCH. |
| 7713XX | XMIT CHANNEL (LEVEL 13) ERROR ON DDT XX (XX = 0-7 for DDT A-H). | NONE. |
| 7715XX | RECEIVE CHANNEL (LEVEL 15) ERROR ON DDT XX (XX = 0-7 for DDT A-H). | NONE |
| 772000 | RAM READ ERROR DURING OVERLAY CALL. | DEPRESS MASTER RESET SWITCH. |
| 770100 | UNABLE TO RESTART CLOCKS DURING HOT START. | RETURN TO STEP H |
| 770200 | DEVICE TIMEOUT OR PARITY ERROR DURING ITR TO MONITOR REGISTER. | DEPRESS MASTER RESET SWITCH. |
| 77XX17 | A TRAP CONDITION OCCURRED IN LEVEL XX (CAUSED BY NON-IMPLEMENTED INSTRUCTION OR ARITHMETIC OVERFLOW). | DEPRESS MASTER RESET SWITCH |
| 776307 | ALL PROGRAM LEVELS EXCEPT LEVEL 63 ARE INACTIVE OR A PERIPHERAL DEVICE WAS EXERCISED WITHOUT PROPER PREPARATION OF KEY AND TERM WORDS. | DEPRESS MASTER RESET SWITCH |

## 2.4 PLANIT SYSTEM SET-UP AND LOADING PROCEDURE FOR TOS$^2$ SSS CONFIGURATION

A.  Set ACC ADDRESS Switches on the IOU to the OCC switch assembly device address (35).

B.  Set the DATA EXCHANGE CHANNEL SELECT switches (IOU Maintenance and Status Panel) A, B and C = 1, 2 and 3 respectively.

C.  Insure a minimum of two drums on-line.

D.  Mount PLANIT LOAD Tape on IBM Tape Drive 0, 1, 2 or 3.

E.  Set TEST switches on IOU Maintenance Panel to one of the following values:

    12 if tape is mounted on Unit 0.
    13 if tape is mounted on Unit 1.
    14 if tape is mounted on Unit 2.
    15 if tape is mounted on Unit 3.
    **See 2.5 for non-standard configuration.**

F.  If the cards file is to be entered via the Card Reader, place cards in input hopper and start Card Reader.

G.  Set INSTRUCTION STOP and press MASTER CLEAR on Computer Test Set.

H.  Set PEBU CHANNEL SELECT switch to 1 and BSL SELECT switch to the TU0-TU3 setting which corresponds to the tape drive selected for system load.

I.  Depress the PEBU Load switch to Bootstrap Load the PLANIT Operating System from the System Tape. If the load is successful, the computer will halt and the DIAGNOSE STATUS Lights will display 777201. If the load is unsuccessful, rewind the System Tape and return to step G.

J.  Set the PEBU CHANNEL SELECT switch to 7.

K.  Release the INSTRUCTION STOP Switch and press the COMPUTER START Switch.  This action will start system initialization.

L.  During the execution of the System Initialization Phase, certain errors may occur which will display any of the following DIAGNOSE STATUS Codes.  The appropriate operator action for each code is indicated.

| DIAGNOSE CODE | OPERATOR ACTION |
| --- | --- |
| 776300 | Rewind system tape and return to step G. |
| 776301 | Rewind system tape and return to step G. |
| 776302 | Rewind system tape and return to step G. |
| 776303 | Check setting of ACC Switches (step A), rewind system tape and return to step G. |
| 776304 | Check setting of TEST switches (step E), rewind system tape and return to step G. |
| 776310 | Check ACC Switch setting (step A), rewind system tape and return to step G. |
| 771700 | Rewind system tape and return to step A. |

M.  The PRIORITY MESSAGE Light on the OCC Switch Assembly should be illuminated within 5 seconds following step L.  If it is not, depress the LAMP TEST Switch on the Switch Assembly.  If the light is inoperative, replace and continue with step N.  If the lamp is operating, check the DIAGNOSE STATUS Display for one of the codes listed in step L.

N.  Depress the OCC PRIORITY MESSAGE Switch

O.  The light associated with the PRIORITY MESSAGE Switch is extenguished and a listing of all peripheral devices and their device addresses will be displayed on the Compose/Edit Display as follows:

CTUO/ARMM1:7/0; CTU1/ARMM2:7/1; CTU2:7/2; CTU3:7/3; RAM 1/0;
DDTAI:2/0; DDTAO:2/1; DDTEI:2/2; DDTBO:2/3; DDTCI:2/4; DDTCO:2/5;
DDTDI:2/6; DDTDO:2/7; DDTEI:1/4; DDTEO:1/5; DDTFI:1/6; DDTFO:1/7;
DDTGI:1/2; DDTGO:1/3; DDTHI:3/0; DDTHO:3/1;
ACCRD:3/6; ACCSA:3/5; ACCCED:3/4;
ELP1:3/3; ELP2:0/0; CARD READER:7/4; CARD PUNCH:7/5; H-S PRINTER:7/6;

In the absence of a display, the following DIAGNOSE STATUS
Code will appear:

| DIAGNOSE CODE | OPERATOR ACTION |
|---|---|
| 771200 | Check for "POWER ON" on Compose/Edit Display Module, rewind system tape and return to step G. |

P.   If no device address changes are desired, go to step R.

Q.   Device address changes are effected as follows:

Each device address is displayed in the form of two octal
digits separated by a slash (/).  Activation of the tab key
will position the cursor to the first digit of each address
in turn.  Thus positioned, either or both digits may be
altered by entering the desired octal digit from the key-
board.

R.   After entering changes (if any), depress the CURSOR RESET Key, then
depress the XMIT Key to store the device addresses displayed
and to print a hard copy of the Device Address Assignments (if
ELP1  is on-line). System malfunction at this time will result in
the display of one of the following DIAGNOSE STATUS Codes:

| DIAGNOSE CODE | OPERATOR ACTION |
|---|---|
| 771201 | Rewind system tape and return to step G.  Do not enter device address whose octal value is less than 6 or greater than 77. |
| 771202 | No operator action required. |
| 771701 | Rewind system tape and return to step G. |

S.   The second program on the system tape (RAMCHECK) will be loaded
next and executed.  Possible errors associated with this or sub-
sequent program loads will result in the display of the following
DIAGNOSE STATUS Codes:

| DIAGNOSE CODE | OPERATOR ACTION |
|---|---|
| 774000 | Recheck steps B and E.   Rewind system tape and return to step G. |
| 774005 | Rewind system tape and return to step G. |

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| DIAGNOSE CODE | OPERATOR ACTION |
|---|---|
| 776305 | Recheck step E.  Rewind system tape and return to step G. |
| 776306 | Rewind system tape and return to step C. |

T.  Execution of RAMCHECK will terminate with the display of one of the following DIAGNOSE STATUS Codes:

0540XX   (XX= # Drums on-line) - Drums are operational and program has advanced to step U.

056001-056020   Non-recoverable error.  Rewind system tape and return to step G.

U.  The remaining programs on the system tape are now being loaded. Errors which may occur during loading and subsequent storage will be displayed as the following DIAGNOSE STATUS Codes:

| DIAGNOSE CODE | OPERATOR ACTION |
|---|---|
| 774001 | Rewind system tape and return to step G. |
| 774002 | Rewind system tape and return to step G. |
| 774003 | Rewind system tape and return to step G. |
| 774004 | Rewind system tape and return to step G. |
| 774005 | Rewind system tape and return to step G. |
| 774006 | Rewind system tape and return to step G. |

V.  Successful conclusion of step U results in the execution of the "START" program which requires prompted inputs from the OCC Terminal Keyboard.  System initialization and loading has been completed.

ADDITIONAL DIAGNOSE STATUS CODES WHICH MAY APPEAR DURING PLANIT
EXECUTION ARE AS FOLLOWS:

| DIAGNOSE CODE | MEANING | OPERATOR ACTION |
|---|---|---|
| 770000 | A NON-IMPLEMENTED PROGRAM LEVEL HAS BEEN REQUESTED. | DEPRESS MASTER RESET SWITCH. |
| 7713XX | XMIT CHANNEL (LEVEL 13) ERROR ON DDT XX (XX = 0-7 for DDT A-H). | NONE. |
| 7715XX | RECEIVE CHANNEL (LEVEL 15) ERROR ON DDT XX (XX = 0-7 for DDT A-H). | NONE |
| 772000 | RAM READ ERROR DURING OVERLAY CALL. | DEPRESS MASTER RESET SWITCH. |
| 770100 | UNABLE TO RESTART CLOCKS DURING HOT START. | RETURN TO STEP F |
| 770200 | DEVICE TIMEOUT OR PARITY ERROR DURING ITR TO MONITOR REGISTER. | DEPRESS MASTER RESET SWITCH. |
| 77XX17 | A TRAP CONDITION OCCURRED IN LEVEL XX (CAUSED BY NON-IMPLEMENTED INSTRUCTION OR ARITHMETIC OVERFLOW). | DEPRESS MASTER RESET SWITCH |
| 776307 | ALL PROGRAM LEVELS EXCEPT LEVEL 63 ARE INACTIVE OR A PERIPHERAL DEVICE WAS EXERCISED WITHOUT PROPER PREPARATION OF KEY AND TERM WORDS. | **DEPRESS MASTER RESET SWITCH** |

**2.5**      <u>Test Switch Settings During System Load</u>

During system loading, the TEST SWITCH settings shown in Figure 2-1 will have the following effects:

a.  The loading device will be based on the right digit of the TEST SWITCH setting.

b.  The Peripheral Device Skeleton (PDS) displayed will be based on the loading device first and secondly on the "system" TEST SWITCH settings as follows:

| | | |
|---|---|---|
| X0 | TACFIRE field PDS | (loading from ARMM-1) |
| X1 | $TOS^2$ field PDS | (loading from POTTER, drive 1) |
| mn | TACFIRE PSS PDS<br>(m = 0, 2, 4 or 6)<br>(n = 2, 3, 4 or 5) | (loading from IBM unit<br>TACFIRE system) |
| pq | $TOS^2$ PSS PDS<br>(p = 1, 3, 5 or 7)<br>(q = 2, 3, 4 or 5) | (loading from IBM unit<br>$TOS^2$ system) |

c.  The selection of MIOD vs VFMED terminal type is based on the left digit of the TEST SWITCH setting; VFMED if 0, 2, 4 or 6; MIOD if 1, 3, 5 or 7.

d.  Operation with short (192-track) vs long (256-track) drums will be based on the left digit of the TEST SWITCH setting.  Short drums if 2, 3, 6 or 7; long drums if 0, 1, 4 or 5.  TEST SWITCH setting has no effect for 3 or 4 bank MCMU system.

LEFT DIGIT TEST SWITCH VALUE MEANINGS:

| VALUE | SYSTEM | DRUM TRACKS |
|-------|--------|-------------|
| OY | TACFIRE | 256 |
| 1Y | TOS$^2$ | 256 |
| 2Y | TACFIRE | 192 |
| 3Y | TOS$^2$ | 192 |
| 4Y | TACFIRE | 256 |
| 5Y | TOS$^2$ | 256 |
| 6Y | TACFIRE | 192 |
| 7Y | TOS$^2$ | 192 |

RIGHT DIGIT TEST SWITCH VALUE MEANINGS:

| VALUE | LOAD DEVICE |
|-------|-------------|
| X0 | LOAD FROM ARMM-1 |
| X1 | LOAD FROM POTTER, DRIVE 1 |
| X2 | LOAD FROM IBM DRIVE 0 |
| X3 | LOAD FROM IBM DRIVE 1 |
| X4 | LOAD FROM IBM DRIVE 2 |
| X5 | LOAD FROM IBM DRIVE 3 |
| X6 | Undefined |
| X7 | Undefined |

FIGURE 2-1.    TEST SWITCH Settings

Example:

To load on a TACFIRE field system with 192 track drums and a mixture
of VFMED and MIOD terminals use the TEST SWITCH value of 30 during system
load.

Change 1

2.6    Test Switch Settings During Hot Start

Anytime after the system has been loaded and PLANIT requests
"PLEASE LOG IN" the TEST SWITCH setting used in conjunction
with the COMPUTER RESTART pushbutton may be used to change
the TAPE, CARD and PRINTER devices from the field device
assignments to the PSS/SSS device assignments or vica versa.
Activating the COMPUTER RESTART will in addition cause a
PLANIT HOT START and resumption of PLANIT with the "PLEASE
LOG IN" message.

The right digit of the TEST SWITCH setting will have the
following affect on system operation only if it has
been changed since system loading:

X0    Clears indications of CARD READER, CARD PUNCH
       and H-S PRINTER.  Replaces four possible tape
       unit assignments with ARMM assignments 1/1 and 3/6.

X1    Clears indications of CARD READER, CARD PUNCH and
       H-S PRINTER.  Replaces four possible tape unit
       assignments with POTTER assignments (all 1/1).

X2     Enters assignments for CARD READER (7/4), CARD
thru   PUNCH (7/5) and H-S PRINTER (7/6).  Replaces four
X7     possible tape unit assignments with IBM
       Commercial assignments (7/0 thru 7/3).

## SECTION 3

### START MODULE PROCEDURES/SEQUENCE OF OPERATIONS

This section describes the procedures, sequence of operations, messages and error indications during the START initialization process.

After POS intiialization (and RAMCHECK if applicable) the next module to be executed is the START Module. START inputs date, time and number of terminals and initializes PLANIT files on a HISTORY start.

### 3.1 Running Message

The first message from START will appear only on the RD screen of the ACC (OCC) and reads as follows:

+START MODULE IS RUNNING

The message is informational and requires no action.

Except as indicated, all messages will only appear on the CE screen of the ACC(OCC).

### 3.2 Date and Time Message

The second message from the START module requests the date and time and will appear as follows:

```
+
+START MODULE, ENTER DATE AND TIME
+FORMAT MODDYY,HHMM
+
```

Enter the date and time in the format indicated.
For example, January 12, 1975 at 6:30 P.M. would be entered as:

011275,1830

If an error is made, the following message is displayed:

```
+DIDNT UNDERSTAND
+START MODULE, ENTER DATE AND TIME
+FORMAT MODDYY,HHMM
+
```

Reenter the date and time.

## 3.3 Type of Start Message

The third message from START requests the type of start and will appear as follows:

```
+
+ENTER TYPE OF START
+COLD START FROM TAPE (TAPE)
+COLD START FROM CARD READER (CARD)
+HISTORY START (HISTORY)
+
```

Enter the type of start as a single word TAPE, CARD or HISTORY. The operator actions and results of the various start types are described below:

a. <u>TAPE</u>. This start type requires no specific operator action. When PLANIT starts execution it will read the CARDS FILE located at the end of the program load tape. Since this will be a PLANIT COLD START the PLANIT FILES will be empty — i.e., no lesson material and no student records.

b. <u>CARD</u>. This reply will cause the system load tape to be rewound and the following message to be displayed:

+YOU MAY REMOVE TAPE FROM ARMM UNIT 0

This start type requires that a CARDS FILE deck be loaded into the card reader and that the card reader be made ready before continuing. When PLANIT starts execution, it will read the CARDS FILE in the card reader. This is also a PLANIT cold start and the PLANIT files will be empty.

3-2

c. <u>HISTORY</u>.  This reply will cause the system load tape to be rewound and the following message to be displayed:

+YOU MAY REMOVE TAPE FROM ARMM UNIT 0

This type of start will require that a HISTORY tape be mounted and made ready on any unit.  Prior to PLANIT's execution, START will read the HISTORY tape and load the PLANIT FILES with the same data that existed at the time of the HISTORY DUMP.  When PLANIT starts execution it will be given a simulated HOT START.

If an error is made the following message is displayed:

3-2a

```
+DIDNT UNDERSTAND
+ENTER TYPE OF START
+COLD START FROM TAPE (TAPE)
+COLD START FROM CARD READER (CARD)
+HISTORY START (HISTORY)
+
```

Reenter the type of start.

## 3.4 Active Terminal Message

The next message from START requests the number of terminals to be
made available to PLANIT.  The first terminal is always the ACC (OCC),
additional terminals are remote terminals connected to DDT A through
DDT H.  The message appears as follows:

```
+
+ENTER NUMBER OF ACTIVE TERMINALS
+(ONE DIGIT, 1 THRU 9)
+
```

If an error is made the following message is displayed:

```
+DIDNT UNDERSTAND
+ENTER NUMBER OF ACTIVE TERMINALS
+(ONE DIGIT, 1 THRU 9)
+
```

Reenter the number of terminals.

## 3.5 RAM Message

The next message from START will be output only if the system con-
figuration includes RAMs.  The message prints the number of online
drums found and the number of bad tracks (in octal).  The message
is informational and requires no operator action.  The message appears
as follows:

```
+
+2 DRUMS ON LINE
+01 BADTRACKS (OCTAL)
```

If there were bad tracks, an informational report will be displayed
which appears as follows:

```
+BADTRACK  ALTERNATE  (DRUM TRACK IN OCTAL)
+1 216      0 003
+1 220      0 004
```

The above report indicates that tracks 216 and 220 (octal) of drum 1
were bad and that tracks 3 and 4 of drum 0 were assigned as alternates.

3.6   History Tape Mount Message

A tape mount request will be displayed if the HISTORY start was
selected.  The message will suggest a tape unit on which to mount
the HISTORY tape (IBM UNIT 0, POTTER UNIT 1 or ARMM UNIT 1) depending
on the system configuration.  The message  appears as follows:

```
+
+PLANIT SUSPENDED, MOUNT INPUT TAPE
+ON IBM UNIT 0
+REEL IDENTITY IS HISTORY
+REPLY CANCEL OR UNIT WHEN COMPLETED (C,0,1,2,3)
+
```

The operator should verify that the tape is mounted and ready on
some unit and then reply with the correct digit (0 thru 3 for IBM
units, 1 thru 4 for POTTER units, 1 or 2 for ARMM units).

The next message is the header data from the HISTORY tape showing
when the HISTORY tape was created; it appears as follows:

HISTORY TAPE DATE 122174 TIME 0420

The HISTORY tape will be loading after this message is displayed.

3.7   START Initialization Complete Message

The last message from START, appears on both the RD screen and on
the CE screen and is as follows:

```
+
+START INITIALIZATION COMPLETE
```

3-4

No operator action is required.

If the HISTORY or TAPE mode was selected the following message will be displayed:

+YOU MAY REMOVE TAPE FROM IBM UNIT 0

The operator may remove the tape at this time.

3.8 <u>PLANIT Log In Message</u>
The next message to appear will be the PLANIT log in message which is as follows:

PLEASE LOG IN***

3.9 <u>START Error Messages</u>

Error messages from START are shown in Table 3-I.   A typical error message is shown below:

```
+HISTORY LOAD PROBLEM
+HISTORY TAPE HEADER RECORD INVALID
+DO YOU WISH TO RETRY HISTORY LOAD (Y,N)
+
```

Enter a Y for yes or an N for no.

The Y response will rewind the tape and cause the following message:

+YOU MAY REMOVE TAPE FROM IBM UNIT 0

It is not necessary to remove the tape and the next message will be the ·tape mount message as described in 3.6.

3-5

If the N response is given the following message will be displayed:

+LOAD NEXT SYSTEM ON COMPUTER

No further operation is possible until the next system is booted into the computer.

TABLE 3-I.   ERROR MESSAGES FROM START (Sheet 1 of 3)

| MESSAGE | POSSIBLE CAUSE | RECOMMENDED ACTION |
|---|---|---|
| +START FAILURE, CANT OPEN TERMINAL<br><br>(Note:  Appears on RD screen only) | ACC turned off or failing.  ACC incorrectly cabled or IOX switches incorrect. | Turn on ACC (if off) verify configuration of system. If recovery is effected, date and time will be asked for, however error message will remain on RD screen. |
| +SYSTEM LOAD ABORTED - NO RECOVERY<br>+MORE THAN 64 BAD TRACKS, PLANIT CANNOT RUN<br>+TRY RELOADING SYSTEM | Badtracks on drum(s) exceed 64 | Try reloading system.  Replace drum or turn off failing drum.  PLANIT requires one or two drums depending on PLANIT file allocation |
| +SYSTEM LOAD ABORTED - NO RECOVERY<br>+FILE DID NOT OPEN<br>+TRY RELOADING SYSTEM | Not enough RAMs or MCMUs on line and HISTORY tape from larger system. | Verify number of on-line RAMs or MCMUs and origin of history tape.  Try reloading system. |

3-7

TABLE 3-I. ERROR MESSAGES FROM START (Sheet 2 of 3)

| MESSAGE | POSSIBLE CAUSE | RECOMMENDED ACTION |
|---|---|---|
| +HISTORY LOAD PROBLEM<br>+MOUNT OR HISTORY TAPE NOT ACCOMPLISHED<br>+DO YOU WISH TO RETRY HISTORY LOAD? (Y,N)<br>+ | Incorrect or no response to tape mount message. | Enter Y (yes) and respond correctly to tape mount message |
| +HISTORY LOAD PROBLEM<br>+MOUNT OF HISTORY TAPE NOT APPROVED<br>+DO YOU WISH TO RETRY HISTORY LOAD? (Y,N)<br>+ | Incorrect response to tape mount message. | Enter Y (yes) and respond correctly to tape mount message. |
| +HISTORY LOAD PROBLEM<br>+HISTORY TAPE DID NOT OPEN<br>+DO YOU WISH TO RETRY HISTORY LOAD? (Y,N)<br>+ | No tape was mounted or tape was not mounted on correct unit. | Enter Y (yes) and respond correctly to tape mount message. Verify location of HISTORY tape. |
| +HISTORY LOAD PROBLEM<br>+HISTORY TAPE HEADER RECORD INVALID<br>+DO YOU WISH TO RETRY HISTORY LOAD? (Y,N)<br>+ | Incorrect tape was mounted or incorrect response given to tape mount message. | Enter Y (yes) and verify tape to be read in is HISTORY tape. |

TABLE 3-I. ERROR MESSAGES FROM START (Sheet 3 of 3)

| MESSAGE | POSSIBLE CAUSE | RECOMMENDED ACTION |
|---|---|---|
| +HISTORY LOAD PROBLEM<br>+HISTORY TAPE UNRECOVERABLE ERROR<br>+DO YOU WISH TO RETRY HISTORY LOAD? (Y,N)<br>+ | Tape error | Enter Y (yes) and try again.<br>If still no good, use older<br>history tape. |
| +HISTORY LOAD PROBLEM<br>+UNRECOVERABLE FILE WRITE ERROR<br>+DO YOU WISH TO RETRY HISTORY LOAD? (Y,N) | RAM controller error | Enter Y (yes) and try again.<br>If still no good use RAMFI<br>program to verify RAM status. |

This section describes the procedures, sequence of operations, messages, and error indications during MIOP/TMIOP operations.

MIOP/TMIOP messages consist of tape mount messages. PLANIT termination messages and error messages. Tape mount messages are utilized by both the START and FINAL modules as well as PLANIT.

4.1 Mount Input Tape Message. PLANIT operation is suspended when a tape mount request is made. A typical request will appear as follows:

```
+
+PLANIT SUSPENDED, MOUNT INPUT TAPE
+ON IBM UNIT 0
+REEL IDENTITY IS TEST 001
+REPLY CANCEL OR UNIT WHEN COMPLETED (C,0,1,2,3)
+
```

The message "MOUNT INPUT TAPE" indicates that the tape will be read only. It is suggested that the write ring be removed before mounting. The message also suggests a unit on which to mount the tape, that unit or any free unit may be used. The next line gives the reel identity, in this case "TEST 001."

The operator should either cancel the request or mount the tape and reply with the proper digit (0 thru 3 for IBM units, 1 or 2 for ARMM units, 1 thru 4 for POTTER units).

If an error is made, one of the following will replace the top line of the mount message:

a) +INVALID REPLY, TRY AGAIN

A reply other than C or a legal digit (0 thru 3 for IBM units; 1 thru 4 for POTTER units; 1 or 2 for ARMM units) was given. Reenter reply.

b) +REPLY UNIT IS BUSY, TRY A DIFFERENT UNIT

The unit selected by the operator was not released by PLANIT. Reply with an unused unit.

4-1

Change 1

**4.1.1**    <u>Multi-Lesson Input Tape Message</u>.  The next message is used
to determine if the tape is a multi-lesson tape or not.
The message appears as follows:

```
+
+PLANIT SUSPENDED, A TAPE READ REQUEST HAS BEEN MADE FOR
+REEL nnnnnnnn LESSON pppppppp.
+
+IS THE NAMED LESSON PART OF A MULTI-LESSON REEL?
+REPLY YES, NO OR CANCEL. (Y,N,C)
```

The message indicates the reel and lesson name requested for
the read request.  The message gives the operator the
opportunity to verify the lesson name and reel against
various tape inventories.

The operator should either cancel the request or reply Y or
N as appropriate.

If an operator error is made the top line of the message will
be replaced by the following:

```
+INVALID REPLY, TRY AGAIN.
```

A reply other than Y, N or C was given.
Re-enter reply.

If the reply is N, the tape is rewound and PLANIT will read the
tape.

If the reply is Y, the tape will be automatically positioned
by MIOP before PLANIT will read the tape.

4.2  Mount Card Input Tape Message.  PLANIT operation is suspended
when this tape mount request is made. A typical request will appear
as follows:

```
+
+PLANIT SUSPENDED, MOUNT CARD INPUT TAPE
+ON ARMM UNIT 1
+IDENTITY IS CARD INPUT TAPE
+REPLY CANCEL OR UNIT WHEN COMPLETED (C,1,2)
+
```

This message is a special case of the mount input tape message.  The
tape mounted must be in a special format created by the stand alone
PLANIT Utility Program (PUP) or a card output tape created by this
system (see 4.4).

The operator should either cancel the request or mount the requested
tape on an available unit.  The operator should then reply with the
proper digit (0 thru 3 for IBM units, 1 thru 4 for POTTER units, 1
or 2 for ARMM units).

If an error is made one of the following will replace the top line of
the mount message:

a)  +INVALID REPLY, TRY AGAIN
b)  +REPLY UNIT BUSY, TRY A DIFFERENT UNIT

See 4.1 a) and b) for a description of the errors.

4.3  Mount Write Enabled Scratch Tape Message.  PLANIT operation is
suspended when a tape mount request is made.  A typical request will
appear as follows:

```
+
+PLANIT SUSPENDED, MOUNT WRITE ENABLED SCRATCH TAPE
+ON IBM UNIT 0
+REEL IDENTITY IS TEST 002
+REPLY CANCEL OR UNIT WHEN COMPLETED (C,0,1,2,3)
+
```

The message "MOUNT WRITE ENABLED SCRATCH TAPE" indicates that the
tape will be written on.  The message also suggests a unit on which

4-3

to mount the tape, that unit or any free unit may be used.  The
next line gives the reel identify, in this case "TEST 002."

The operator should either cancel the request or mount the tape
and reply with the proper digit (0 thru 3 for IBM units, 1 thru 4 for
POTTER units, 1 or 2 for ARMM units).

If an error is made one of the following will replace the top line
of the mount message:

a)  +INVALID REPLY, TRY AGAIN

b)  +REPLY UNIT BUSY, TRY A DIFFERENT UNIT

See 4.1 a) and b) for a description of the errors.

4.3.1     Multi-Lesson Output Tape Message.   The next message is
          used to determine if the tape is to be a multi-lesson
          tape or not.   The message appears as follows:

              +
              +PLANIT SUSPENDED, A TAPE WRITE REQUEST HAS BEEN MADE FOR
              +REEL nnnnnnnn LESSON pppppppp.
              +
              +IS THE NAMED LESSON PART OF A MULTI-LESSON REEL?
              +REPLY YES, NO OR CANCEL. (Y,N,C)

The message indicates the reel and lesson name which will be
written on the tape.   The message gives the operator the
opportunity to verify the lesson name and reel before continuing.

The operator should either cancel the request or reply Y or
N as appropriate.

If an operator error is made the top line of the message will
be replaced by the following:

              +INVALID REPLY, TRY AGAIN

              A reply other than Y, N or C was given.
              Re-enter reply.

If the reply is N, the tape is rewound and PLANIT will write the lesson on the tape.

If the reply is Y, the next message will be displayed.

4.3.2    First Record Output Tape Message.  The third message is used to determine if the lesson is to be written as the first file on the tape.  The message appears as follows:

```
+
+PLANIT SUSPENDED, A TAPE WRITE REQUEST HAS BEEN MADE FOR
+REEL nnnnnnnn LESSON pppppppp.
+IS THE NAMED LESSON TO BE WRITTEN
+AS THE FIRST RECORD ON THE REEL?
+REPLY YES, NO OR CANCEL. (Y,N,C)
```

This message gives the opportunity to add a new lesson to an existing tape (N response) or start a new tape (Y response).

The operator should either cancel the request or reply Y or N as appropriate.

If an operator error is made the top line of the display will be replaced by the following:

```
+INVALID REPLY, TRY AGAIN
```

A reply other than Y, N or C was given. Re-enter reply.

If the reply is N, the tape is rewound and PLANIT will write the lesson on the tape.

If the reply is Y, the tape will be automatically positioned by MIOP before PLANIT writes the lesson on tape.

4-5

**4.4** <u>Mount Card Output Tape Message</u>. PLANIT operation is suspended when this tape mount request is made. A typical request will appear as follows:

```
+
+PLANIT SUSPENDED, MOUNT WRITE ENABLED SCRATCH TAPE
+ON IBM UNIT 2
+MARK IDENTITY AS CARD OUTPUT TAPE
+REPLY CANCEL OR UNIT WHEN COMPLETED (C,0,1,2,3)
+
```

This message is a special case of the mount output tape message. The card output tape will be written in a special packed format which can only be read by the stand alone PLANIT Utility Program (PUP) or as a card input tape in this system. (see 4.2).

The operator should either cancel the request or mount a scratch tape on an available unit. The operator should then reply with the proper digit (0 thru 3 for IBM units, 1 thru 4 for POTTER units, 1 or 2 for ARMM units).

If an error is made, one of the following will replace the top line of the mount message:
a)   +INVALID REPLY, TRY AGAIN
b)   +REPLY UNIT BUSY, TRY A DIFFERENT UNIT
See 4.1 a) and b) for a description of the errors.

4-6

4.5  Remove Tape Message.  When PLANIT is finished with a tape it will
cause the following typical message to be displayed:

+YOU MAY REMOVE TAPE FROM IBM UNIT 0

The unit is now free for use and the reel or MLU may be removed
and labeled as required.

4.6  PLANIT Termination Messages.  When PLANIT terminates it will produce
one of the following messages:

+PLANIT NORMAL END            (In response to PLANIT
+DUMP HISTORY TAPE? (Y,N)      QUIT ALL Command.)

or:

+PLANIT FATAL ERROR 000.       (In response to PLANIT
+DUMP HISTORY TAPE? (Y,N)       FATAL ERROR indication.)

In the case of a "FATAL ERROR" the number given is a PLANIT error
number and is described in the PLANIT manual.

At this point the operator must determine whether a HISTORY TAPE
should be made.  As a general rule, a HISTORY TAPE should be made
for the PLANIT NORMAL END condition and none should be made for the
PLANIT FATAL ERROR condition.

A HISTORY TAPE preserves lesson and student record files so that
system operation can be resumed with no loss of data.

The N (no) response to the "DUMP HISTORY TAPE" question will produce
the following message:

+PRESS MASTER RESET TO HOT START PLANIT IF DESIRED
+OTHERWISE MOUNT NEXT SYSTEM
+FINI

As indicated the computer can be MASTER RESET which will restart
PLANIT or the next system can be loaded.

The Y(yes) response to the "DUMP HISTORY TAPE" question will cause
the FINAL module to be executed (see Section 5).

4.7  RD Screen Error Messages . Table 4-I    shows the error messages
which may appear on the RD screen of the ACC(OCC).  The most recent
error will be at the bottom of the screen and errors will move from
the bottom to the top of the screen as more errors occur.    The
error messages appearing on the RD screen require no action and
PLANIT, START on FINAL will put out specific messages requesting
action should any be required.

<div align="center">

**Table 4-I.    RD Screen Error Messages**

ERROR ON POTTER UNIT X
ERROR ON IBM UNIT X
ERROR ON ARMM UNIT X
ERROR ON CARD READER
ERROR ON CARD PUNCH
ERROR ON SYSTEM LINE PRINTER
ERROR ON ELP1
ERROR ON TERMINAL X
ERROR ON DRUM
PAPER LOW ELP1
PAPER LOW ELP2

</div>

**4.8**     <u>MIOP Error Messages and Error Correction</u>.  Table 4-II shows
the error messages which may occur during MIOP tape positioning
of multi-lesson tape reels.  Most of the errors will cause an
automatic cancellation of the request and return to PLANIT
for further activity.

**4.8.1**    <u>Multi-Lesson Tape Inventory</u>.  To inventory a tape, use the
PLANIT request "GET TAPEINV nnnn".  MIOP will detect the lesson
name "TAPEINV", rewind the tape and display headers, six at a
time, until a double EOF is detected.  A cancel will be returned
to PLANIT at the completion of the task and the tape will be
rewound.  Reel and lesson name checking is bypassed and
no multi-lesson questions are asked.

**4.8.2**    <u>Multi-Lesson Tape Error Correction</u>.  Tape correction is provided
in the write mode by responding to error messages.  The tape
correction is limited to ending the tape or rewriting over the
invalid lesson and rewriting all following lessons.  Either of
the following messages will be displayed when an error
situation is encountered:

**Message A.**     +
                +WRITE REQUEST FOR EEEL nnnnnnnn LESSON pppppppp
                +REEL DOES NOT MATCH TAPE HEADER WHICH IS:
                0999     FM1     ZFM1     GERMAS
                +REPLY OK TO WRITE NEW LESSON, END TO END TAPE OR
                +CANCEL. (OK,END,C)

**Message B.**     +
                +WRITE REQUEST FOR REEL nnnnnnnn LESSON pppppppp
                +LESSON MATCHES EXISTING TAPE HEADER WHICH IS:
                09999     FM1     ZFM1     GERMAS
                +REPLY OK TO WRITE NEW LESSON, END TO END TAPE OR
                +CANCEL. (OK,END,C)

The END response to message A or B will cause two End of File
(EOF) marks to be written over the header record, ending the tape.

The OK response to message A or B will allow PLANIT to write
the desired lesson over the header record.

The following examples illustrate correction of typical problems:

## Example 1

To correct a reel number error where the TAPEINV display is as follows:

```
212      MATH1      ZMATH1      DOE
212      MATH2      ZMATH2      DOE
222      MATH3      ZMATH3      DOE
212      MATH4      ZMATH4      DOE
END OF TAPE
```

a.   Position the tape manually at BOT.

b.   SAVE the correct lesson and Reel, i.e.,
     "SAVE MATH3 212".

c.   Message  A  will be displayed, Reply "OK".

d.   When completed SAVE the next lesson on tape, i.e.,
     "SAVE MATH4 212".

## Example 2

To correct a lesson name error where the TAPEINV display is as follows:

```
100      TANKS1      ZTANKS1      DOE
100      RIVER       ZRIVER       JOE
100      TANKS3      ZTANKS3      DOE
END OF TAPE
```

a.   Position the tape manually at BOT.

b.   SAVE the incorrect lesson and reel, i.e.,
     "SAVE RIVER 100".

c.   Message  B  will be displayed, Reply "END".
     Tape will be ended and rewound.

d.   SAVE the correct lessons and reel, i.e., SAVE TANKS2
     100" and "SAVE TANKS3 100".

<u>Example 3</u>

To correct a tape on which the last lesson is not complete
(end of tape encountered), and where the last part of the
TAPEINV display is as follows:

```
...
900        MATH50      ZMATH50     DOE
900        MATH51      ZMATH51     DOE
TAPE ERROR
```

NOTE:  The "TAPE ERROR" entry indicates the lesson preceeding
(MATH51) was bad.

a.    Position the tape manually at BOT.

b.    SAVE the last lesson and reel, i.e., "SAVE MATH51 900".

c.    Message  B  will be displayed, Reply "END".

TABLE 4-II.   ERROR MESSAGES FROM MIOP (Sheet 1 of 2)

| Message | Cause | Recommended Action |
|---------|-------|--------------------|
| + <br> +READ REQUEST FOR REEL nnnnnnn LESSON ppppppp <br> +CAN NOT BE PROCESSED AT THIS TIME. <br> +WAIT FOR COMPLETION OF PRESTORE OR PUNCH JOB(S) <br> +AND TRY AGAIN. <br> +REQUEST AUTOMATICALLY CANCELLED. | The Buffer used for tape positioning is allocated to a Prestore or Punch job. | Cancel or wait for completion of Prestore or punch job and try again. |
| + <br> +WRITE REQUEST FOR REEL nnnnnnn LESSON ppppppp <br> +CAN NOT BE PROCESSED AT THIS TIME. <br> +WAIT FOR COMPLETION OF PRESTORE OR PUNCH JOB(S) <br> +AND TRY AGAIN. <br> +REQUEST AUTOMATICALLY CANCELLED. | The Buffer used for tape positioning is allocated to a Prestore or Punch job. | Cancel or wait for completion of Prestore or punch job and try again. |
| + <br> +READ REQUEST FOR REEL nnnnnnn LESSON ppppppp <br> +COULD NOT BE LOCATED. <br> END OF TAPE <br> + <br> +REQUEST AUTOMATICALLY CANCELLED. | The lesson tape was searched from beginning to end and the lesson name could not be located. | Verify spelling of lesson name compared to inventory of lesson tape. |

Change 1

TABLE 4-II.   ERROR MESSAGES FROM MIOP (Sheet 2 of 2)

| Message | Cause | Recommended Action |
|---|---|---|
| +READ REQUEST FOR REEL nnnnnnn LESSON pppppppp<br>+REEL DOES NOT MATCH TAPE HEADER WHICH IS:<br>0999   FM1   AFM1   GERMAS<br>+<br>+REQUEST AUTOMATICALLY CANCELLED. | Incorrect reel was mounted or incorrect unit reply given for tape mount. | Verify lesson name and reel compared to inventory of lesson tape. |
| +WRITE REQUEST FOR REEL nnnnnnnn LESSON pppppppp<br>+REEL DOES NOT MATCH TAPE HEADER WHICH IS:<br>0999   FM1   ZFM1   GERMAS<br>+REPLY OK TO WRITE NEW LESSON, END TO END TAPE OR<br>+CANCEL. (OK,END,C) | Reel number in tape header does not match write request. | See Section 4.8 Tape Error Correction. |
| +WRITE REQUEST FOR REEL nnnnnnn LESSON pppppppp<br>+LESSON MATCHES EXISTING TAPE HEADER WHICH IS:<br>09999   FM1   ZFM1   GERMAS<br>+REPLY OK TO WRITE NEW LESSON, END TO END TAPE OR<br>+CANCEL. (OK,END,C) | Lesson name in tape header matches write request. | See Section 4.8 Tape Error Correction. |

## FINAL MODULE PROCEDURES/SEQUENCE OF OPERATIONS

This section describes the procedures, sequence of operations, messages and error indications during execution of the FINAL module for PLANIT system termination operations.

The FINAL module is activated by replying Y (yes) to the MIOP message "DUMP HISTORY TAPE?". The FINAL module will make a HISTORY tape by copying the contents of all PLANIT files.

### 5.1 Tape Mount Message

The first message to be displayed is the tape mount message. The message will suggest a tape unit on which to mount a write enabled scratch tape which will become the HISTORY tape. The unit suggested depends on the system configuration (IBM UNIT 0, POTTER UNIT 1 or ARMM UNIT 1). A typical message appears as follows:

```
+
+PLANIT SUSPENDED, MOUNT WRITE ENABLED SCRATCH TAPE
+ON IBM UNIT 0
+REEL IDENTITY IS HISTORY
+REPLY CANCEL OR UNIT WHEN COMPLETED (C,0,1,2,3)
+
```

The operator should mount a write enabled scratch on any available unit, double checking that the tape is at load point (beginning of tape) and write enabled. The operator then responds with the correct digit (0 thru 3 for IBM units, 1 thru 4 for POTTER units, 1 or 2 for ARMM units).

### 5.2 History Header Record Message

The next message is the HISTORY tape header record. It includes the current date and time and appears as follows:

```
+HISTORY TAPE DATE 012975 TIME 2356
```

Although the message is informational, it is suggested that the data be copied onto a stick-on-label to be affixed to the physical tape or MLU.

### 5.3 File Allocation Message

The next two messages are an informational table on the PLANIT files and appear as follows for a RAM system:

| FILE | R SIZE | COUNT | DRUM | TRACK | SECTOR |
|------|--------|-------|------|-------|--------|
| 01 | 000640 | 000005 | 0 | 001 | 000 |
| 02 | 000640 | 000010 | 0 | 003 | 004 |
| 03 | 000384 | 000010 | 0 | 009 | 012 |
| 04 | 000320 | 000400 | 0 | 013 | 004 |
| 05 | 001824 | 000050 | 0 | 138 | 004 |

| FILE | R SIZE | COUNT | DRUM | TRACK | SECTOR |
|------|--------|-------|------|-------|--------|
| 06 | 004160 | 000009 | 0 | 227 | 006 |
| 08 | 000064 | 000001 | 1 | 007 | 024 |
| 09 | 004160 | 000002 | 1 | 007 | 026 |
| 10 | 000160 | 000100 | 1 | 015 | 030 |
| 11 | 000160 | 000025 | 1 | 031 | 018 |

For an all MCMU system the report will appear as follows:

| FILE | R SIZE | COUNT | ADDRESS |
|------|--------|-------|---------|
| 01 | 000640 | 000005 | 022000 |
| 02 | 000640 | 000010 | 0237FE |
| 03 | 000384 | 000010 | 0258A0 |
| 04 | 000320 | 000400 | 02F990 |
| 05 | 001824 | 000050 | 03D000 |

| FILE | R SIZE | COUNT | ADDRESS |
|------|--------|-------|---------|
| 06 | 004160 | 000009 | 06E3F0 |
| 08 | 000064 | 000001 | 0A33FC |
| 09 | 004160 | 000002 | 0A34CC |
| 10 | 000160 | 000100 | 100300 |
| 11 | 000160 | 000035 | 12AF30 |

The tables are intrepreted in the following manner:

a) FILE. PLANIT file number 1 thru 11 except 7 which is non-existent.

b) ADDRESS. For the all MCMU system this is the core address (in hex) of the beginning of the file.

c) DRUM, TRACK, SECTOR. For the RAM system this is the address in decimal of the beginning of the file.

d) R SIZE. This is the size of each record in the file in 32 bit words.

e) COUNT. This is the number of records in the file.

The Report is informational and no operator action is required.

## 5.4 Remove Tape Message

When the HISTORY tape is complete the tape will rewind and the following typical message will be output:

+YOU MAY REMOVE TAPE FROM IBM UNIT 1

The tape should be removed, labeled and the write ring removed (if not an MLU).

## 5.5 History Tape Complete Message

The last message from FINAL is as follows:

```
+HISTORY TAPE COMPLETE WITH NO ERRORS
+TRACKS USED 000305 OR MCMU WORDS 312320
+REMOVE HISTORY TAPE
+PRESS MASTER RESET TO HOTSTART PLANIT IF DESIRED
+OTHERWISE MOUNT NEXT SYSTEM
+FINI
```

The first variable is the number of tracks used for a TACFIRE or TOS$^2$ drum system plus the number of bad tracks. The MCMU words value for a drum system is the additional core required to replace the drums and does not include resident core storage.

The MCMU words value for an MCMU system (no drums) is the total core used for resident programs and PLANIT FILES. The tracks value is the track equivalent of the MCMU words and is not directly relateable to a drum system.

As indicated the computer can be MASTER RESET which will restart PLANIT or the next system can be loaded.

## 5.6 FINAL Error Messages

Error messages from FINAL are shown in Table 5-I.

TABLE 5-I. FINAL ERROR MESSAGES (Sheet 1 of 2)

| MESSAGE | POSSIBLE CAUSE | RECOMMENDED ACTION |
|---|---|---|
| +CANNOT REOPEN ACC TERMINAL FOR MESSAGES<br>(Note: Appears on RD screen only) | ACC turned off or failing.<br>ACC incorreclty cabled or<br>IOU switches incorrect. | Turn on ACC (if off) verify<br>configuration of system. If<br>recovery is effected, the<br>error message will remain but<br>normal operation will be<br>possible. |
| +HISTORY DUMP PROBLEM<br>+MOUNT OF HISTORY TAPE NOT ACCOMPLISHED<br>+DO YOU WISH TO RETRY HISTORY DUMP? (Y,N)<br>+ | Incorrect or no response<br>to tape mount message. | Enter Y (yes) and respond<br>correctly to tape mount<br>message. |
| +HISTORY DUMP PROBLEM<br>+MOUNT OF HISTORY TAPE NOT APPROVED<br>+DO YOU WISH TO RETRY HISTORY DUMP? (Y,N)<br>+ | Incorrect response to<br>tape mount message | Enter Y (yes) and respond<br>correctly to tape mount<br>message. |
| +HISTORY DUMP PROBLEM<br>+HISTORY TAPE DID NOT OPEN<br>+DO YOU WISH TO RETRY HISTORY DUMP? (Y,N)<br>+ | No tape was mounted or<br>tape was not mounted on<br>correct unit. | Enter Y (yes) and respond<br>correctly to tape mount<br>message. Verify location<br>of scratch tape. |

TABLE 5-I. FINAL ERROR MESSAGES (Sheet 2 of 2)

| MESSAGE | POSSIBLE CAUSE | RECOMMENDED ACTION |
|---|---|---|
| +HISTORY DUMP PROBLEM<br>+HISTORY TAPE UNRECOVERABLE ERROR<br>+DO YOU WISH TO RETRY HISTORY DUMP? (Y,N)<br>+ | Tape error | Enter Y (yes) and try again.<br>If still no good, use a dif-<br>ferent scratch tape. |
| +HISTORY DUMP PROBLEM<br>+UNRECOVERABLE DRUM READ ERROR<br>+DO YOU WISH TO RETRY HISTORY DUMP? (Y,N)<br>+ | RAM controller error | Enter Y (yes) and try again.<br>If still no good use RAMFI<br>program to verify RAM status. |

# APPENDIX A

## DIAGNOSTIC STATUS (DIG) CODES

| CODE | MEANING |
|------|---------|
| 0540XX | RAM IS FUNCTIONAL. THERE ARE XX DRUMS ON-LINE. |
| 056001 | DEVICE TIMEOUT ON ITR FROM DRUM DURING RAMCHECK EXECUTION. |
| 056002 | INPUT PARITY ERROR ON ITR FROM DRUM DURING RAMCHECK EXECUTION. |
| 056003 | DEVICE TIMEOUT ON OFR TO DRUM DURING RAMCHECK EXECUTION. |
| 056004 | DEVICE TIMEOUT ON DEV TO DRUM DURING RAMCHECK EXECUTION. |
| 056005 | BUSY FAULT BIT SET IN ITR WORD FROM DRUM DURING RAMCHECK EXECUTION. |
| 056006 | ERROR BIT SET IN ITR WORD FROM DRUM DURING RAMCHECK EXECUTION. |
| 056007 | F&I BITS IN DRUM TERMWORD NOT SET AT CONCLUSION OF DRUM OPERATION DURING RAMCHECK EXECUTION. |
| 056010 | TRANSMISSION OR OPERATIONAL ERROR BIT SET IN DRUM TERMWORD DURING RAMCHECK EXECUTION. |
| 056011 | COMPUTER ERROR OR DRUM WRITE PARITY ERROR DURING RAMCHECK EXECUTION. |
| 056012 | DRUM READ PARITY ERROR DURING RAMCHECK EXECUTION. |
| 056013 | EOB COUNT IN TERMWORD NOT ZERO AT CONCLUSION OF DRUM OPERATION DURING RAMCHECK EXECUTION. |
| 056014 | STATUS ERROR ON ITR FROM DRUM DURING RAMCHECK EXECUTION. |
| 056015 | DRUM 0 NOT ON LINE. |
| 056016* | DRUM WRITE DATA ERROR. |
| 056017* | DRUM READ DATA ERROR. |
| 056020 | DRUMS NOT ASSIGNED CONSECUTIVELY. |
| 770000 | ACTIVATION OF A NON-IMPLEMENTED LEVEL HAS BEEN REQUESTED. |
| 770100 | DEVICE TIMEOUT OCCURRED WHILE ATTEMPTING TO RESTART REAL TIME CLOCKS 1 AND 2 DURING A HOT START. |
| 770200 | DEVICE TIMEOUT OR A PARITY ERROR ON ITR FROM MONITOR REGISTER DURING LEVEL 2 I/O ERROR INTERRUPT PROCESSING. |
| 771200 | ERROR OCCURRED DURING ATTEMPT TO DISPLAY I/O DEVICE ADDRESSES ON COMPOSE/EDIT SCREEN. ERROR CAUSED BY ONE OF THE FOLLOWING: |
| | 1. DEVICE TIMEOUT ON DEVICE COMMAND. |
| | 2. TRANSMISSION ERROR. |
| | 3. OPERATIONAL ERROR. |
| | 4. STATUS ERROR. |
| 771201 | AN ILLEGAL I/O DEVICE ADDRESS WAS ENTERED VIA KEYBOARD. |

---

\* RAM CONTROLLER FAILURE. READS ARE PERFORMED WITH THE IGNORE DATA INABLE
BIT SET. WRITE ERRORS SHOULD NOT BE DETECTABLE.

| CODE | MEANING |
|------|---------|
| 771202 | A BUFFER OSCILLATOR MALFUNCTION OR A PARITY ERROR OCCURRED DURING THE OUTPUT OF THE DEVICE ADDRESS TABLE TO THE ELP. |
| 7713XX | TRANSMIT CHANNEL ERROR ON DDT XX (0-7 for DDT A-H). |
| 7715XX | RECEIVE CHANNEL ERROR ON DDT XX (0-7 for DDT A-H). |
| 771700 | DEVICE TIMEOUT OR PARITY ERROR ON ITR FROM LOCAL TERMINAL (ACC/OCC). |

771701    ERROR OCCURRED DURING ATTEMPT TO READ C/E DISPLAY:

1. DEVICE TIMEOUT ON DEVICE COMMAND.

2. TRANSMISSION ERROR.

3. OPERATIONAL ERROR.

4. STATUS ERROR.

772000    ERROR WHILE LOADING OVERLAY FROM DRUM TO CORE.

1. DEVICE TIMEOUT ON ITR, OFR, OR DEVICE COMMAND TO DRUM.

2. STATUS ERROR.

3. OVERLAY LOAD NOT COMPLETED WITHIN 250 MILLISECONDS.

| 774000 | DEVICE TIMEOUT ON OFR TO SET EOB COUNTER FOR IBM TAPE READ. |
|--------|---------|
| 774001 | PROGRAM MODULE LOADED FROM SYSTEM TAPE HAS ILLEGAL I.D. OR IS OUT OF SEQUENCE. |
| 774002 | DEVICE TIMEOUT ON DEVICE COMMAND TO WRITE OVERLAY ON DRUM. |

774003    ERROR DURING ATTEMPT TO WRITE OVERLAY ON DRUM.

1. F&I BITS NOT SET.

2. EOB COUNT NOT ZERO.

774004    STATUS ERROR DURING ATTEMPT TO WRITE OVERLAY ON DRUM.

774005    ERROR READING PROGRAM MODULE FROM SYSTEM TAPES:

1. DEVICE TIMEOUT ON READ COMMAND.

2. MODULE NOT READ WITHIN 5 SECONDS.

3. END OF TAPE (ARMM OR POTTER).

4. STATUS ERROR.

5. DEVICE AND CHANNEL END BITS NOT SET WITHIN 5 SECONDS OF READ COMMAND (IBM).

| 774006 | DEVICE TIMEOUT ON OFR OR ITR TO DRUM DURING OVERLAY STORAGE ON DRUM. |
|--------|---------|
| 776300 | DEVICE TIMEOUT ON OFR TO SET MONITOR REGISTER DURING SYSTEM INITIALIZATION. |
| 776301 | DEVICE TIMEOUT OR PARITY ERROR ON ITR TO READ ACC ADDRESS AND TEST SWITCHES DURING SYSTEM INITIALIZATION. |

| CODE | MEANING |
| --- | --- |
| 776302 | DEVICE TIMEOUT ON COMMAND TO START REAL TIME CLOCKS 1 AND 2. |
| 776303 | LOCAL TERMINAL (ACC/OCC) ADDRESS ENTERED VIA ACC ADDRESS SWITCHES LESS THAN OCTAL "13." |
| 776304 | TEST SWITCH SETTING FOR SELECTION OF SYSTEM TAPE DRIVE IS NOT AN ACCEPTABLE VALUE. |
| 776305 | DEVICE ADDRESS FOR SELECTED SYSTEM TAPE DRIVE = 0. |
| 776306 | DEVICE TIMEOUT ON ITR FROM DRUM DURING SYSTEM INITIALIZATION. |
| 776307 | SYSTEM INITIALIZATION (LEVEL 63) HAS BEEN ILLEGALLY ACTIVATED. |
| 776310 | DEVICE TIMEOUT ON OFR TO ILLUMINATE THE MESSAGE WAITING SWITCH (PRIORITY MESSAGE) ON THE LOCAL TERMINAL (ACC/OCC). |
| 77XX17 | OVERFLOW TRAP (ARITHMETIC OVERFLOW OR NON-IMPLEMENTED INSTRUCTION) OCCURRED IN LEVEL XX. |

# APPENDIX B
## LOCAL TERMINAL (ACC/OCC) OPERATING PROCEDURES

1. The following sequence of steps is designed to assist the student/operator in preparing the ACC/OCC as the PLANIT Local Terminal.

   A. **MANDATORY REQUIREMENTS:**
      1. ACC/OCC POWER Switch ON.
      2. Keyboard POWER Switch ON.
      3. COMPOSE MODE Switch ON.
      4. AUX I/O Switch OFF.

   B. **OPTIONAL REQUIREMENTS:**
      1. RD POWER Switch ON.

         The RD Screen is used by PLANIT to display information which is useful but not necessary for successful terminal operation.
      2. ELP1 POWER Switch ON.

         All information displayed on the Compose/Edit Display will be printed via ELP1 except if ELP1 is the only printer available and is being used as a system printer for a PLANIT specified function. The unavailability of an ELP prevents execution of PLANIT listing functions and hard copies of C/E displays during execution of PLANIT system printer functions.

2. Terminal Operating Procedures.

   A. **TERMINAL INPUT:**

      Messages generated by PLANIT to be displayed on the C/E screen are transmitted to the terminal only when requested by the student/operator.

      Whenever a PLANIT message is ready for transmission to the terminal, the PRIORITY MESSAGE Switch on the Switch/Assembly is illuminated to alert the student/operator. The student/operator will receive the message on the C/E Display when

he depresses the PRIORITY MESSAGE Switch. If the entire
message can be displayed on one screen, the light asso-
ciated with the PRIORITY MESSAGE Switch is extinguished.
If the message length exceeds the display screen size the
PRIORITY MESSAGE Switch light will remain lighted. Sub-
sequent depression(s) of the PRIORITY MESSAGE Switch will
display the remaining portion(s) of the message.

B. **TERMINAL OUTPUT**

If a message received from PLANIT requires a response from
the student/operator, the top line of the C/E display will
be blank to accommodate this student/operator response which
is entered as follows:

1. Reset the cursor.
2. Enter the response via the keyboard (72 characters max.).
3. (Optional) Enter EOT ( ⌐ ) character.
4. Reset the cursor.
5. Depress the XMIT Switch.

Failure of the terminal to transmit is indicated by the
illumination of the XMTG light and by the failure
of the cursor to re-position itself beyond the end of the
message. Remedial action consists of turning the COMPOSE
MODE Switch OFF, then ON, then repeating steps 4 and 5 above.
Repeated failures may necessitate a hot start.

C. **MESSAGE REPEAT:**

If the student/operator requires a re-display of the last
message received depression of the CYCLE MESSAGES Switch on the
Switch Assembly will initiate a retransmission of the last
message display segment.

D. **SUMMARY:**

Excepting the keyboard entry keys, only three ACC/OCC switches
are normally utilized during PLANIT Terminal Operations:

1. PRIORITY MESSAGE - press when lighted to receive
   PLANIT message.
2. CYCLE MESSAGES - press when repeat of last PLANIT message
   is desired.

3.  XMIT - press when response to PLANIT message has been
    entered into top line of C/E display. Message length
    may be up to 72 characters; messages should be
    (optional on ACC/OCC) followed by an EOT (⌐) character.

## REMOTE TERMINAL (MIOD) OPERATING PROCEDURES

1.  The following sequence of steps is designed to assist the student/operator in preparing the MIOD as a PLANIT remote terminal.

   A.  **OPERATIONAL REQUIREMENTS:**

   1.  DDT associated with MIOD properly set up [max of one MIOD per computer DDT (A-H) channel].
   2.  DDT POWER Switch ON.
   3.  Keyboard POWER Switch ON.
   4.  COMPOSE MODE Switch ON.
   5.  AUX I/O Switch OFF.
   6.  ELP POWER Switch ON.
   7.  ELP CHANNEL SELECT Switch set to "O".

2.  Terminal Operating Procedures.

   A.  **TERMINAL INPUT:**

   Messages generated by PLANIT to be displayed on the C/E screen are transmitted to the terminal only when requested by the student/operator. Whenever a PLANIT message is ready for transmission to the terminal, the MESSAGE READY Switch is illuminated to alert the student/operator. The student/operator should reset the cursor and will receive the message on the C/E display when he depresses the MESSAGE READY Switch. If the message length exceeds the display screen size, the first line of the display screen will advise "PRESS ACK FOR REST OF MESSAGE". Resetting the cursor and depression of the ACK Switch will display the next portion of the message.

   B.  **TERMINAL OUTPUT:**

   If a message received from PLANIT requires a response from the student/operator, the top line of the C/E display will be blank (except for OOOOFJ) to accommodate the student/operator response which is entered as follows:

   1.  Reset the cursor.
   2.  Enter the communications address preamble JOOOO (numeric zeros) via the keyboard.

3. Enter the response via the keyboard (67 characters max., one line of display only).
4. Enter the EOT (⌐) character.
5. Reset the cursor.
6. Depress the XMIT Switch.

Failure of the terminal to transmit is indicated by the failure of the cursor to reposition itself just beyond the EOT marker. Remedial action consists of turning the COMPOSE MODE Switch OFF, then ON, then repeating steps 5 and 6 above.

C. <u>MESSAGE REPEAT</u>:

If the student/operator requires a re-display of the last message received, the student/operator resets the cursor and depresses the RE-XMIT Switch which will initiate a retransmission of the last message display segment.

D. <u>SUMMARY</u>:

Excepting the keyboard entry keys, only four MIOD Switches are normally utilized during PLANIT terminal operations:

1. MESSAGE READY - press when lighted to receive PLANIT message.

2. RE-XMIT - press when repeat of last PLANIT message is desired.

3. ACK - press when directed to do so on C/E display.

4. XMIT - press when response to PLANIT message has been entered into top line of C/E display. Message must start with the communications address preamble (J0000 letter J, numeric zeros) followed by a message of no more than 67 characters (one line of display) followed by an EOT (⌐) character.

## APPENDIX D
### REMOTE TERMINAL (VFMED) OPERATING PROCEDURES

1.  The following sequence of steps is designed to assist the student/ operator in preparing the VFMED as a PLANIT remote terminal.

    A.  **OPERATIONAL REQUIREMENTS:**

        1.  DDT associated with VFMED properly set up [ max of one VFMED per computer DDT (A-H) channel].

        2.  DDT POWER Switch ON.

        3.  Keyboard POWER Switch ON.

        4.  COMPOSE MODE Switch OFF. (after Cursor Reset to top of display).

        5.  AUX I/O Switch OFF.

        6.  ELP POWER Switch ON.

        7.  ELP CHANNEL SELECT Switch set to "O".

2.  Terminal Operating Procedures.

    A.  *TERMINAL INPUT:*

    Messages generated by PLANIT to be displayed on the C/E screen are transmitted to the terminal only when requested by the student/operator. Whenever a PLANIT message is ready for transmission to the terminal, the message "0000TJ MESSAGE WAITING, PRESS ACK SWITCH" is printed and the MESSAGE Light is illuminated to alert the student/operator. The student/ operator will receive the message on the C/E display when he resets the cursor* and depresses the ACK Switch. If the message length exceeds the display screen size, the first line of the display screen will advise, "PRESS ACK FOR REST OF MESSAGE". Resetting the cursor* and depression of the ACK Switch will display the next portion of the message.

    B.  *TERMINAL OUTPUT:*

    If a message received from PLANIT requires a response from the student/operator, the top line of the C/E display will be blank (except for 00003J) to accommodate the student/operator response which is entered as follows:

---

* To reset the cursor, turn COMPOSE MODE Switch on, depress CURSOR RESET, then turn COMPOSE MODE Switch off.

1. Switch COMPOSE MODE Switch to ON.

2. Reset the cursor.

3. Enter the communications address preamble J0000 (numeric zeros) via the keyboard.

4. Enter the response via the keyboard (67 characters max., one line of display only).

5. Enter the EOT (⌐) character.

6. Reset the cursor.

7. Depress the XMIT Switch.

8. Reset the cursor.

9. Switch COMPOSE MODE Switch to OFF.

Failure of the terminal to transmit is indicated by the failure of the cursor to reposition itself just beyond the EOT marker after XMIT (step 7 above). Remedial action consists of turning the COMPOSE MODE Switch OFF, then ON, then repeating steps 6-9 above.

C. **MESSAGE REPEAT**:

If the student/operator requires a re-display of the last message received the student/operator resets the cursor[*] and depresses the RE-XMIT Switch which will initiate a retransmission of the last message display segment.

D. **SUMMARY**:

Excepting the keyboard entry keys, only three VFMED Switches are normally utilized during PLANIT terminal operation:

1. RE-XMIT - press when repeat of last PLANIT message is desired.

2. ACK - press when directed to do so on C/E display.

3. XMIT - press when response to PLANIT message has been entered into top line of C/E display. Message must start with the communications address preamble (J0000; letter J, numeric zeros) followed by a message of no more than 67 characters (one line of display) followed by an EOT (⌐) character.

---

[*] To reset the cursor, turn COMPOSE MODE Switch on, depress CURSOR RESET, then turn COMPOSE MODE Switch off.

D-2

# APPENDIX E

## AN/GYK-12 PLANIT SYSTEM CHARACTER SETS

Table E-I summarizes the character differences between: 1) the TACFIRE (and TOS$^2$) AN/GYK-12 PLANIT system ASCII and EBCDIC character sets, 2) the ARI CDC 3300 character set, and 3) the ARI Univac 1108 character set.

The AN/GYK-12 PLANIT character set includes the letters A through Z zero (0) through 9 and the special characters shown in Table E-I. The AN/GYK-12 PLANIT system operates internally with the ASCII Character Set and code converts to from the EBCDIC Character Set for output to or input from the commercial card punch, card reader and the high speed printer.

In addition to the special characters shown in Table E-I, the system includes the following ASCII/EBCDIC characters:

> Quote (") - EBCDIC punch 7, 8
> At (@) - EBCDIC punch 4, 8
> Greater than ( > ) - EBCDIC punch 0, 6, 8
> Underscore (__)- EBCDIC punch 0, 5, 8

Unrecognized EBCDIC input characters (including ¢, see below) are code converted in the AN/GYK-12 planit system to the ASCII ACK character (⋈). Unrecognized ASCII output characters including the ASCII ACK (⋈), NAK (⊗), EOT ( ⊣), left bracket ([) and right bracket (]) are code converted to the EBCDIC cents character ( ¢ ); EBCDIC punch 12, 2, 8.

E-1

## Table B-1

### PLANIT Character Set Differences - AN/GYK-12 and ARI Commercial Systems

| TACFIRE PLANIT (ASCII) CHARACTER | IBM (EBCDIC) PUNCH | 029 KEY PUNCH CHARACTER | CDC PUNCH | 029 KEY PUNCH CHARACTER | UNIVAC PUNCH | 029 KEY PUNCH CHARACTER |
|---|---|---|---|---|---|---|
| Plus + | 12,6,8 | + | 12 | ? | 12 | ? |
| Minus _ | 11 | - | 11 | - | 11 | - |
| Asterisk * | 11,4.8 | * | 11,4,8 | * | 11,4,8 | * |
| Slash / | 0,1 | / | 0,1 | / | 0,1 | / |
| Open Paren ( | 12,5,8 | ( | 0,4,8 | % | 0,4,8 | ⌐ |
| Close Paren ) | 11,5,8 | ) | 12,4.8 | < | 12,4,8 | < |
| Period . | 12,3,8 | . | 12,3,8 | . | 12,3,8 | . |
| Percent % | 0,4,8 | % | 12,6,8 | + | 0,5,8 | — |
| Equals = | 6,8 | = | 3,8 | # | 3,8 | ≠ |
| Comma , | 0,3,8 | , | 0,3,8 | , | 0,3,8 | , |
| Colon : | 2,8 | : | 2,8 | : | 5,8 | / |
| Semi-colon ; | 11,6,8 | ; | 5,8 | / | 11,6,8 | ; |
| Prime | 5,8 | ' | 4,8 | @ | 4,8 | @ |
| Backslash \ | 11,7,8 | ⌐ | 11,2,8 | ! | 0,6,8 | ＞ |
| Blank | | (Blank) | | (Blank) | | (Blank) |
| Pound Sign # | 3,8 | # | 12,5,8 | ( | 2,8 (1) | : |
| Ver Arrow ^ | 12,7,8 | \| | 11,5,8 | ) | 11,7,8 | ⌐ |
| Hor Arrow < | 12,4,8 | < | 12,2,8 | ¢ | 11,6,8 | ; |
| Question Mk ? | 0,7,8 | ? | 11,7,8 | ⌐ | 12,0 | ¡̈ (multi-punch) |
| Dollar Sign $ | 11,3,8 | $ | 11,3,8 | $ | 11,3,8 | S |
| Exclamation ! | 11,2,8 | ! | None | (Blank) | 11,0 | ¡̈ (multi-punch) |
| Ampersand & | 12 | & | None | (Blank) | 2,8 | : |

(1)  An ampersand is used for the Pound Sign in this system.

(2)  Letters A-Z and numbers 0-9 are same in all three code sets.

B-2

# APPENDIX F

## PLANIT CARDS FILE

```
C-0123456789ABCDEFGHIJKLMNOPQRSTUVWXYZ+-*/(). =,::'- #!<?$        04000200
          ABCDEBCHAJCLMNABCRCDARWCAC                             
1.$ '                                                            04000300
2.$ "                                                            04000400
C:THE TWO CARDS ABOVE PERMIT THE ADDING OF NEW CHARACTERS        04000500
C:THAT MAY BE FOUND ON THE TERMINAL AND EQUATING THE NEW ONE     04000600
C:(2ND CARD) WITH THE OLD ONE (1ST CARD) DIRECTLY ABOVE IT.  THE 04000700
C:OLD CHARACTER MUST BE FROM THE LIST ON THE FIRST CARD.  THUS   04000800
C:THE " IS EQUATED TO THE ' AND LOWER CASE LETTERS MAY BE ADDED  04000900
C:ON THE 2ND CARD IN A SIMILAR MANNER, EQUATING THEM WITH UPPER  04001000
C:CASE WHICH WOULD BE ADDED TO THE 1ST CARD.  IF ADDITIONAL SPACE 04001100
C:IS NEEDED, REPEAT THE PAIR OF CARDS IMMEDIATELY BELOW.         04001200
C:                                                               04001300
C:-NOTE- THE BACKSLASH CHARACTER IN THE FIRST CARD HAS BEEN      04001400
C:CHANGED TO A $ TO FACILITATE TRANSPORT.  IT SHOULD BE CHANGED  04001500
C:BACK AGAIN IF THAT CHARACTER IS DESIRED.                       04001600
C:                                                               04001700
IRECRD IFBTN NAMES NSRCH KEEP LINKS NOCMBN PRIME PI OPERATOR ISYS 04001800
NEGPOS NJMCH WDEF ADDLOG TQUANT NOTUSED IFIRST IDCHK PRICES      04001900
C:                                                               04002000
C:THE FOLLOWING (IFBTN) CARD CONTAINS THE TOTAL COUNTS           04002100
C:OF THE NUMBER OF DISK RECORDS WHICH HAVE BEEN ALLOCATED        04002200
C:TO EACH OF THE II DISK FILES.  PLANIT WILL USE ANY OF          04002300
C:THESE BUT NO MORE.  DO A COLD START AFTER ANY CHANGE.          04002400
IFBTN  5  15  15  400  50  9  0  1  2  100  25                   04002500
C:                                                               04002600
C:THE CARDS BELOW MUST LIST EACH PLANIT PROCEDURE NUMBER AFTER   04002700
C:THE OVERLAY PARTITION NUMBER ON WHICH IT RESIDES.  NUMBER ZERO 04002800
C:IS THE MAIN PROGRAM.  UNASSIGNED PROCEDURE NUMBERS ARE IGNORED 04002900
C:EVEN THOUGH THEY HAPPEN TO BE IN THE LIST BELOW.               04003000
1# 26,27,28,29,30,31,32,33,34,35,36,37                          04003100
2# 39,40,41,42,43,44,45,46,47,48,49                             04003200
3# 50,51,52,53,54,55,56,57,58                                   04003300
4# 60,61,62,63,64,65,66,67                                      04003400
5# 69,70,71,72,73,74,75,76                                      04003500
6# 78,79,80,81                                                  04003600
7# 83,84,85,86,87,88,89                                         04003700
8# 91,92,93,94,95,96,97,98                                      04003800
C:                                                               04003900
C:THE ORDER OF THE FIRST FOUR CARDS MUST NOT BE CHANGED.  THE    04004000
C:NEXT CARDS TO HERE HAVE SOME ORDER RELATIONSHIPS WITH THOSE    04004100
C:THAT FOLLOW AND SHOULD COME EARLY IN THE DECK.  THE ORDER      04004200
C:OF THE REMAINING CARDS UP TO THE ADDLOG CARDS ARE OPTIONAL     04004300
C:(THE ADDLOG CARDS MUST IMMEDIATELY PRECEDE THE FINAL $E$$ CARD). 04004400
C:                                                               04004500
OPERATOR = 1                                                     04004600
C:A SECOND NUMBER MAY APPEAR AFTER THE OPERATOR'S NUMBER         04004700
C:WHICH WILL INITIALIZE AN IAUX TERMINAL IF SO DESIRED.          04004800
NJMCH=9                                                          04004900
C:THE ABOVE 'NJMCH' MAY BE LESS THAN THE GENERATED 'NJMCH'       04005000
C:IF DESIRED.                                                    04005100
C:                                                               04005200
TQUANT=10                                                        04005300
```

```
C:IQUANT (QUANTUM) UNITS ARE CONSISTENT WITH THE <SECDIV>          04005400
C:PARMETER (NUMBER OF UNITS PER SECOND).                           04005500
IDCHK(1) STJ                                                       04005600
C:THE NAME IN IDCHK(1) WILL DESIGNATE THE PREFIX OF STUDENT LOGINS. 04005700
PRICES 1.0 .033 .055 .009                                          04005800
C:PRICES ARE IN PENNIES FOR CPU/SEC, CONNECT SECONDS, UNIT         04005900
C:RECORD UNITS, AND DISK SPACE PER <RECSZE> WORDS PER DAY.         04006000
C:                                                                 04006100
C:THE ISYS, NAMES AND NEGPOS ARRAYS CONTAIN ALL THE PRIMITIVE      04006200
C:NAMES OF PLANIT.  THESE MAY BE CHANGED IF DESIRED SO LONG AS     04006300
C:THEY REMAIN DISTINCT (WITHIN EACH ARRAY).                        04006400
C:                                                                 04006500
ISYS A F T D DATE ENTRY VALUE LOOK PRESTORE PUNCH ADDLOG DELLOG OK 04006600
ISYS(14) CANCEL QUIT AUX SAVE UCT TOC DEBUG DELETE BUILD LIST      04006700
ISYS(24) SRM UNLOAD ADD EXCEPT ALL EDTEXT ACCOUNT JOBS            04006800
NEGPOS(1) P)SNEG                                                   04006900
PRIME 3 5 7 11 13 17 19 23 29 31 37 41 43 47 53 59 61 67 71       04007000
   73 79 83 89 91 97                                              04007100
PI=3.1416                                                          04007200
NOCMAN 68 69 78 87 84 89 90 91 92 93 72 59 105 106 110           04007300
   129 71 76 111 125 95 96                                        04007400
C:                                                                 04007500
C:THE FOLLOWING MDEF ENTRIES ARE SET TO (-1) TO DESIGNATE         04007600
C:THAT THE CORRESPONDING CALL AUTHOR NAMES ARE TO BE             04007700
C:INITIALIZED IN THE ALLOWED STATUS.  ANY AUTHOR ENTRY BEYOND     04007800
C:THE 67TH ONE MAY BE THUS INITIALIZED.                          04007900
MDEF(103) -1                                                       04008000
MDEF(109) -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 -1             04008100
MDEF(125) -1                                                       04008200
MDEF(129) -1                                                       04008300
KFEP 1 64 54 53 30 37 46 27 157 107 112 160                      04008400
LINKS 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 109    04008500
LINKS(27) 28 29 0 31 32 33 34 35 36 104                          04008600
LINKS(37) 38 39 40 41 42 43 44 45 0                              04008700
LINKS(46) 47 48 49 50 51 52 0                                    04008800
LINKS(53) 54 55 56 57 58 0                                       04008900
LINKS(59) 60 61 62 63 0                                          04009000
LINKS(64) 65 66 67 0                                              04009100
LINKS(68) 0 70 73 76 69 84 80 81 82                              04009200
LINKS(77) 123 120 72 87 83 75 77 74                              04009300
LINKS(85) 78 79 68                                               04009400
LINKS(88) 87 90 91 92 93 94 95 96 98 0 127 100 101 102 105 110  04009500
LINKS(104) 109 106 108 88 104 0                                  04009600
LINKS(110) 0 129 117 114 103 116 125 118 119 120 121 122        04009700
LINKS(122) 115 124 85 111 86 128 99 113                         04009800
LINKS(156) 0 158 159 71                                          04009900
LINKS(159) 0                                                      04010000
NAMES S P O I E N A COPY EX BREAK GET SAVE OUT RESTART           04010100
NAMES(15) UNLOCK LOCK CLEAR ATTACH DISPLAY SYSTEM DIAL           04010200
NAMES(27) T NOT CANNOT                                            04010300
NAMES(30) FROM ALL NONE RIGHT WRONG SEEN USED                    04010400
NAMES(37) YES CORRECT TRUE RIGHT OK POSITIVE PLUS ACCURATE SO    04010500
NAMES(46) NO WRONG FALSE INCORRECT NEGATIVE MINUS INACCURATE     04010600
```

```
NAMES(53) LS LO EQ GO GR NO                                              04010700
NAMES(59) IF AND OR ELSE END                                            04010800
NAMES(64) F R C B                                                       04010900
NAMES(68) CHANGE SET TO PRINT DROP ROUND TEMP FINISHED ALIGN            04011000
NAMES(77) FOR MATRIX NORMAL ARRAY READY RETURN SUM PROD                 04011100
NAMES(85) FUNCTION RANDOM ASSIGN                                        04011200
NAMES(88) KEYWORD PHONETIC FORMULAS EQUATE TRACE                        04011300
NAMES(93) RELATED WAIT RECYCLE TEXT                                     04011400
NAMES(98) WITHIN STATUS TIME FRAME RESPONSE REVIEW MINUTES ALLOW        04011500
NAMES(106) PROHIBIT GOTO REEL CALC                                      04011600
NAMES(110) HELP RANK SORT COMB FACT LOG LN SIN COS TAN                  04011700
NAMES(120) COT SEC CSC ABSOLUTE TRUNCATE INVERT                         04011800
NAMES(126) PI USE REPLY SORT                                            04011900
NAMES(157) ON OFF ALL LINK                                              04012000
NSRCH 13 45 51 52 53 55 58 59 65 66 67 70                               04012100
NSRCH(13) 0 0 0 0 0 10 9 12 11 13 14 15 22 23 25 16 17 18 19 20 0 0     04012200
NSRCH(35) 0 9 17 18 19 22 23 -11 20 25 -10 -12 -13 -14 -15 16           04012300
NSRCH(51) 0                                                             04012400
NSRCH(52) 24                                                            04012500
NSRCH(53) 24 25                                                         04012600
NSRCH(55) 1 16 25                                                       04012700
NSRCH(58) 25                                                            04012800
NSRCH(59) 24 2 3 4 5 25                                                 04012900
NSRCH(65) 2                                                             04013000
NSRCH(66) 8                                                             04013100
NSRCH(67) 6 7 8                                                         04013200
1.1 ENTER CALC LINE.                                                    04013300
2.2 (P)(D)(A)(Q)(P.)(D.)(M.)(Q.)                                        04013400
3.3 NO DISK. BACKGROUND HALTED.                                         04013500
126.265 = ?                                                             04013600
149.147 (M.*                                                            04013700
10.1 DONE                                                               04013800
11.1 GONE                                                               04013900
12.1 IN                                                                 04014000
13.1 WILL DO                                                            04014100
60.274 ENTER COMMAND                                                    04014200
67.244 D/M/D/P                                                          04014300
68.68(10) DONE                                                          04014400
69.69 FRAME                                                             
70.262 LABEL=*                                                          04014600
75.245 G2. STATEMENTS                                                   04014700
78.246 G2. CRITERIA                                                     04014800
81.249 G2. TEXT                                                         04014900
82.250 G3. ANSWERS                                                      04015000
83.252 G4. ACTIONS                                                      04015100
84.249(81)                                                              04015200
85.250(82)                                                              04015300
86.252(83)                                                              04015400
101.259 7MATCH7                                                         04015500
102.260 OK? (Y/N)                                                       04015600
103.261 7FRM7/T7/                                                       04015700
104.104 AT FRAME                                                        04015800
105.105 . GROUP                                                         04015900
```

```
106.106 . LINE                                              04016000
112.112 READY,                                             04016100
120.267 ENTER SYSTEM COMMAND.                              04016200
122.122    TO: $                                            04016300
125.$ *10**                                                 04016400
128.128 DEBUG MODE.                                        04016500
132.132 BREAK AT                                           04016600
135.135 **STUDENT**                                        04016700
136.136 FUNCTIONS**                                        04016800
137.137 MATRICES**                                         04016900
138.138 ITEMS**                                            04017000
139.139 **LESSON**                                         04017100
150.150 ENTER YOUR ANSWER                                  04017200
152.152 CORRECT                                            04017300
153.153 FINE                                               04017400
154.154 GOOD                                               04017500
155.155 OK                                                 04017600
156.156 RIGHT                                              04017700
157.157 TRUE                                               04017800
158.158 VERY GOOD                                          04017900
159.159 YES                                                04018000
162.162 FALSE                                              04018100
163.163 INCORRECT                                          04018200
164.164 NO                                                 04018300
165.165 NOT SO                                             04018400
166.166 NOT TRUE                                           04018500
167.167 WRONG                                              04018600
169.169 WRONG,TRY AGAIN                                    04018700
170.170 NUMERIC ANSWER PLEASE                              04018800
206                                                         04018900
14.228 SYNONYMS HAVE BEEN DROPPED                          04019000
15.229 CAN'T USE THIS NAME WITH ALLOW OR PROHIBIT          04019100
16.230 UNRECOGNIZED                                        04019200
17.231 NAME IS AUTHOR PROTECTED                            04019300
18.233 ILLEGAL EXPONENTIATION                              04019400
19.232 LINE CONTINUATION NOT PERMITTED
20.233 ILLEGAL DIVISION BY ZERO                            04019600
21.233 ILLEGAL COMBINATORIAL                               04019700
22.233 ILLEGAL USE OF LOGS                                 04019800
23.233 ILLEGAL NEGATIVE SQUARE ROOT                        04019900
24.233 ILLEGAL USE OF TRIG FUNCTION                        04020000
25.233 FACTORIAL LIMITS EXCEEDED                           04020100
26.233 ILLEGAL CHARACTER ON LINE                           04020200
27.233 ILLEGAL DECIMAL POINT IN NUMBER                     04020300
28.233 COMMA MISUSED                                       04020400
29.233    MISUSED                                           04020500
30.233 NUMBER OR SYMBOL MISPLACED                          04020600
31.233 LEFT PARENTHESIS MISSING                            04020700
32.233 RIGHT PARENTHESIS MISSING                           04020800
33.233 '=' MISUSED                                          04020900
34.233 NAME MISUSED                                        04021000
35.233 NAME NOT FOUND                                      04021100
36.233 NAME ALREADY IN USE                                 04021200
```

| | |
|---|---|
| 37.233 ILLEGAL--NOT A MATRIX | 04021300 |
| 38.233 BUILT-IN NAME CAN'T BF REDEFINED | 04021400 |
| 39.234 VARIABLE HAS NOT PREVIOUSLY BEEN DEFINED | 04021500 |
| 40.235 ILLEGAL FORMAT. ONLY TYPF THE COMMAND NAME AND DESIRED | 04021600 |
| ENTRY LABEL (OF JUST THE COMMAND NAME ALONE). | 04021700 |
| 41.233 FUNCTION CAN'T CALL ON ITSELF | 04021800 |
| 42.233 ILLEGAL USE OF 'FOR' | 04021900 |
| 43.233 ILLEGAL SUBSCRIPTING | 04022000 |
| 44.233 SUBSCRIPTING EXCEEDS DEFINED RANGE | 04022100 |
| 45.233 WRONG NUMBER OF ARGUMENTS OR SUBSCRIPTS | 04022200 |
| 46.233 MATRICES ARE NOT CONFORMABLE | 04022300 |
| 47.233 MATRIX MUST BE N BY N TO INVERT | 04022400 |
| 48.233 A SINGULAR MATRIX CAN'T BF INVERTED | 04022500 |
| 49.236 HANGING EXPRESSION | 04022600 |
| 50.237 MATRIX SPACE IS FULL | 04022700 |
| 51.237 ITEM SPACE IS FULL | 04022800 |
| 52.237 FUNCTION SPACE IS FULL | 04022900 |
| 53.233 WORK SPACE EXCEEDED | 04023000 |
| 54.233 'FOR' VARIABLE NOT CLOSING IN ON TERMINAL VALUE | 04023100 |
| 55.233 ALIGN STATEMENT MUST SPECIFY A COLUMN | 04023200 |
| 56.233 LABEL NAME NOT VALID. TYPE JUST THE COMMAND NAME TO SEE | 04023300 |
| THE FULL LIST. | 04023400 |
| 57.233 PAIRED PRIME MISSING | 04023500 |
| 58.1 ENTER LABEL | 04023600 |
| 59.1 EXIT TO | 04023700 |
| 61.61 PLEASE LOG IN***$ | 04023800 |
| 114.60 UNNAMED LESSON RESTORED. | 04023900 |
| 312.312 PLANIT TERMINAL NO. | 04024000 |
| 62.241 ILLEGAL USE OF SLASH | 04024100 |
| 63.63 ENTER NEXT LINE OF LESSON | 04024200 |
| 64.60 NAME OR FORMAT ERROR. | 04024300 |
| 65.60 NO SUCH FRAME/LABEL | 04024400 |
| 66.60 FRAME TABLE FULL. DELETE BEFORE ADDING | |
| 71.71 SAVE LESSON? (Y/N) | 04024600 |
| 72.242 FRAME DIRECTORY FULL. | 04024700 |
| 73.243 ILLEGAL GROUP | 04024800 |
| 74.70 ILLEGAL LABEL/FRAME. ENTER COMMAND | 04024900 |
| 76.76 RECORDS FOR | 04025000 |
| 77.77 NEW LESSON? (Y/N) | 04025100 |
| 79.60 READ-ONLY. CANNOT ALTER LESSON. | 04025200 |
| 80.248 ILLEGAL FRAME TYPE CHANGE | 04025300 |
| 87.87 INVALID | 04025400 |
| 88.253 ILLEGAL ANSWER FORMAT | 04025500 |
| 89.254 ILLEGAL MIX OF ANSWER TYPES | 04025600 |
| 90.255 JELIMITERS NOT PROPERLY PAIRED. | 04025700 |
| 91.60 FRAME DOESN'T EXIST | 04025800 |
| 92.60 GROUP DOESN'T EXIST | 04025900 |
| 93.60 LINE DOESN'T EXIST | 04026000 |
| 94.60 FRAME LENGTH EXCEEDED | 04026100 |
| 95.95 ELSE/END MUST FOLLOW IF | 04026200 |
| 96.96 ILLEGAL DIRECTIVE...AND/OR MUST FOLLOW IF | 04026300 |
| 97.97 RECORD TABLE FULL AND NO MORE WILL BE KEPT. LESSON | 04026400 |
| WILL CONTINUE BUT YOU SHOULD PROBABLY SIGN OFF AND GET HELP. | 04026500 |

```
98.257 FRAME LABEL EXISTS.  LABEL=$                                    04026600
99.258 FRAME EXISTS                                                    04026700
100.258 GROUP EXISTS                                                   04026800
107.60 LINE EXCEEDED                                                   04026900
108.108 IDENTIFY YOURSELF***$                                          04027000
109.316 NOT ON DISK.                                                   04027100
110.60 WRONG REEL NO.                                                  04027200
111.60 AUTHORING COMMANDS RESTRICTED. GET YOUR LESSON.                 04027300
113.60 RESTART OR SAVE LESSON FIRST.                                   04027400
115.60 NO DISK SPACE ON                                                04027500
116.60 NO G3. ANSWERS. ERROR                                           04027600
117.60 DECISION STATEMENT MUST START WITH A CONNECTIVE OR F.C.B.R.     04027700
118.260 DUPLICATE LESSON NAME                                          04027800
119.1 ILLEGAL USE OF READY                                             04027900
121.120 SAVE LESSON ONTO TAPE FIRST.                                   04028000
123.120 UNLOAD AND SAVE LESSON ONTO TAPE FIRST.                        04028100
124.60 INTEGERS ONLY FOR GROUPS/LINES/COLUMNS                          04028200
127.127 LESSON REEL                                                    04028300
129.129 CHOOSE ONE:                                                    04028400
130.60(109) NOT ON DISK.                                               04028500
131.60 LESSON END                                                      04028600
133.269 IMPROPER KEYWORD SPECIFICATION                                 04028700
134.60  TO NONEXISTENT FRAME/LABEL                                     04028800
140.140  NONE-DEFINED                                                  04028900
141.270 IMPROPER FROM SPECIFICATION                                    04029000
142.270 ERROR IN DECISION STATEMENT                                    04029100
143.270 TAGS MISSING IN DECISION STATEMENT                             04029200
144.144 NUMBER OF FRAMES LEFT                                          04029300
145.145 YOU'VE BEEN LOGGED OFF DUE TO A BAD LESSON.                    04029400
146.120(64)
147.120(90)                                                            04029600
148.120 DEVICE IS BUSY.  TRY LATER.                                    04029700
151.151 CAN'T USE CALC JUST NOW.                                       04029800
160.160(152) THIS ENTRY IS RESERVED FOR NEW FEEDBACK MSGS.            04029900
161.161(152) THIS ENTRY IS RESERVED FOR NEW FEEDBACK MSGS.            04030000
168.168 THE ANSWER IS:                                                 04030100
171.171 CHOOSE ONE OF THE ABOVE LETTERS.                               04030200
172.172 ANSWER EITHER YES OR NO.                                       04030300
173.173 ILLEGAL USE OF F: NO CORRECT ANSWER SEPCIFIED                  04030400
174.174 ILLEGAL USE OF R:                                              04030500
175.60 ILLEGAL C:  NO CORRECT ANSWER SPECEFIED.                        04030600
176.176 ILLEGAL BRANCH                                                 04030700
177.177 DATE                                                           04030800
178.178 STUDENT HISTORY                                                04030900
179.179 STUDENT SUMMARY                                                04031000
180.180 LESSON NAME                                                    04031100
181.181 . STUDENT NAME                                                 04031200
182.182    FRAME    TYPE    TIME    NEUTRAL    ANSWER    LABEL         04031300
183.183                     MIN/    RIGHT+     TAG                      04031400
184.184                     SEC     WRONG-                             04031500
185.185 NUMBER RIGHT                                                   04031600
186.186 NUMBER WRONG                                                   04031700
187.187 NUMBER ENTRIES                                                 04031800
```

| | | |
|---|---|---|
| 188.188 | NUMBER TIME-OUTS | 04031900 |
| 189.189 | TOTAL TIME | 04032000 |
| 190.233 | FOR MUST BE COMBINED WITH SUM OR PROD | 04032100 |
| 191.60 | DISK I/O ERROR. GET HELP. IF NOT AVBL. TYPE OUT TO LOGOUT. | 04032200 |
| 192.192 | END | 04032300 |
| 193.193 | START | 04032400 |
| 194.194 | LESSON NOT ON REEL SPECIFIED. | 04032500 |
| 195.195 | ENTER RECORD NAMES. FOLLOW ALL BUT LAST NAME BY A COMMA. | 04032600 |
| 196.196 | NEW TAPE? (Y/N) | 04032700 |
| 197.197 | NO ENTRY LABELS ARE AVAILABLE AT THIS TIME. | 04032800 |
| 198.198 | SUMMARY ONLY? (Y/N) | 04032900 |
| 199.199 | TO THE TERMINAL? (Y/N) | 04033000 |
| 200.200 | CARD READER ERROR | 04033100 |
| 201.60 | TAPE REQUEST CANCELLED. | 04033200 |
| 202.202 | BILLING PERIOD: | 04033300 |
| 203.120 | DEVICE OUT OF SERVICE. | 04033400 |
| 204.204 | IDENTITY     CPU     UNIT-REC   CONNECT    MEM | 04033500 |
| | ORY    CURR-MEM   TOTAL | 0403360C |
| 205.205 | ILLEGAL GROUP NUMBER. | 04033700 |
| 206.206 | DUPLICATE FRAME NUMBER--INCREMENTED BY 0.01. | 04033800 |
| 207.207 | CONTINUATION CARD DOES NOT FOLLOW A PROPER LINE. | 04033900 |
| 208.208 | LABEL TABLE FULL. | 04034000 |
| 209.209 | DUPLICATE LABEL. | 04034100 |
| 210.1 | ENTER HELP(ANY BUILT-IN OR USER DEFINED NAME) | 04034200 |
| 211.1 | RANK(MATRIXNAME)--RANKS THE VALUES OF THE MATRIX. | 04034300 |
| 212.1 | SQRT(EXPRESSION)--POSITIVE SQUARE ROOT FUNCTION. | 04034400 |
| 213.1 | COMB(M,N)--COMBINATION OF M THINGS TAKEN N AT A TIME. | |
| 214.1 | FACT(EXPRESSION)--FACTORIAL FUNCTION. | 04034600 |
| 215.1 | LOG(NUMBER,BASE)--LOG TO ANY BASE. | 04034700 |
| 216.1 | LN(NUMBER)--LOG TO THE BASE E. | 04034800 |
| 217.1 | SIN(EXPRESSION)--SINE FUNCTION. | 04034900 |
| 218.1 | COS(EXPRESSION)--COSINE FUNCTION. | 04035000 |
| 219.1 | TAN(EXPRESSION)--TANGENT FUNCTION. | 04035100 |
| 220.1 | COT(EXPRESSION)--COTANGENT FUNCTION. | 04035200 |
| 221.1 | SEC(EXPRESSION)--SECANT FUNCTION. | 04035300 |
| 222.1 | CSC(EXPRESSION)--COSECANT FUNCTION. | 04035400 |
| 223.1 | ABSOLUTE(EXPRESSION)--ABSOLUTE VALUE FUNCTION. | 04035500 |
| 224.1 | TRUNCATE(EXPRESSION)--ROUNDS TO AN INTEGER. | 04035600 |
| 225.1 | INVERT(MATRIXNAME)--PERFORMS A MATRIX INVERSE OPERATION. | 04035700 |
| 226.1 | A BUILT-IN 1 X 10 MATRIX. CONSULT TM-4422/002 PARTV FOR ITS USE. | 04035800 |
| 227.1 | BUILT-IN NAME. CONSULT TM-4422/002 PART V FOR ITS USE. | 04035900 |
| 228.1 | BUILT-IN NAMES CAN'T BE DROPPED. | 04036000 |
| 229.1 | NAME ENTERED CAN'T BE DENIED USING THE COMMAND--PROHIBIT(NAME). | 04036100 |
| 230.1 | NAME ENTERED CAN'T BE FOUND. | 04036200 |
| 231.1 | CAN'T ALTER AN AUTHOR DEFINED NAME. | 04036300 |
| 232.1 | A CALC STATEMENT CAN'T EXCEED A SINGLE LINE IN A LESSON. | 04036400 |
| 233.1 | CONSULT TM-4422/002 APPENDIX C FOR REPRESENTATIVE ERROR SITUATIONS | 04036500 |
| 234.1 | SORRY, BUT YOU LOST FRAME NO. | 04036600 |
| 235.40 | A COMMA OR TOO MANY LABELS HAVE BEEN ENTERED. | 04036700 |
| 236.1 | STATEMENT IS AMBIGUOUS AND CAN'T BE EVALUATED. | 04036800 |
| 237.1 | DELETE AN ITEM, FUNCTION, OR MATRIX AND TRY AGAIN. | 04036900 |
| 238.238 | BACKGROUND OPERATIONAL. LEVEL | 04037000 |
| 239.239 | GROUP 1 CARD FORMAT ERROR. | 04037100 |

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240.120 NOT FOUND.                                                          04037200
241.60 A NUMBER MUST FOLLOW THE + OR -.                                     04037300
242.60 DELETE ONE OR MORE FRAMES TO CONTINUE.                               04037400
243.60 GROUP NUMBER ENTERED IS NOT LEGAL FOR THE TYPE OF FRAME.             04037500
244.251 (Q)UESTION/(M)ULTIPLE CHOICE/(D)ECISION/(P)ROGRAMMING               04037600
245.75 G2.  ENTER PROGRAMMING STATEMENTS                                    04037700
246.78 G2.  ENTER DECISION STATEMENTS                                       04037800
247.1 'REPLY' MUST FOLLOW 'SET' OR 'USE.'                                   04037900
248.60 CAN'T MAKE A Q OR M FRAME INTO A D OR P FRAME OR VICE VERSA.         04038000
249.81 G2.  SPECIFY QUESTION.                                               04038100
250.82 G3.  SPECIFY ANSWERS.                                                04038200
251.67 ENTER FRAME TYPE.                                                    04038300
252.83 G4.  SPECIFY ACTIONS.                                                04038400
253.60 ANSWER TAG FORMAT IS ILLEGAL, E.G., .A OR +.A                        04038500
254.60 NUMBER AND LETTER ANSWER TAGS CAN'T BE MIXED WITH DELIMITERS.        04038600
255.60  ANSWER IN A CONDITIONAL Q FRAME MUST BE ENCLOSED BY DELIMITERS      04038700
256.250 BACKGROUND HALTED.                                                  04038800
257.98 A LESSON CAN'T CONTAIN A DUPLICATE FRAME LABEL. ENTER ANOTHER.       04038900
258.60 CAN'T INSERT OVER AN EXISTING FRAME OR GROUP.                        04039000
259.101 SPECIFY CHARACTERS TO BE USED IN SEARCH.                            04039100
260.102 REQUEST CONFIRMATION THAT RANGE OF FRAMES IS TO BE DELETED.         04039200
261.103 SPECIFY CHARACTERS FOR MODIFICATION.                               04039300
262.263 LABEL FRAME IF DESIRED.                                             04039400
263.70 A LABEL MUST START WITH A LETTER.                                    04039500
264.264 PRESS RETURN TO TRY AGAIN OR TYPE #RESTART TO ESCAPE.               04039600
265.265 BACKGROUND JOBS MUST FINISH FIRST.                                  04039700
266.60 REPEAT THE COMMAND WITH A DIFFERENT NAME.                            04039800
267.120 THE SYSTEM COMMANDS FOR AN AUTHOR: ACCOUNT, BUILD,                  04039900
    DELETE, EDTEXT, LIST, UNLOAD.                                           04040000
268.1 ENTER A VALUE FOR THE INDICATED NAME.                                 04040150
269.60 KEYWORD WAS NOT FOLLOWED BY ALL, OFF, ON, OR A NUMBER.               04040200
270.270(233) CONSULT TM-4422/002 APPENDIX C. FOR ERROR SITUATIONS.          04040300
271.271 JOB AT TOP OF QUEUE IS                                              04040400
272.260 ENTER Y TO UNLOAD OR N TO ADD MORE NAMES.                           04040500
273.60 LESSON ACCESS DENIED BY AUTHOR.                                      04040600
274.60 PLANIT COMMANDS ARE: A (APPEND), ATTACH, BREAK, CALC,                04040700
    CLEAR, COPY, D (DELETE), DIAL, DISPLAY, E (EDIT), EX (EXECUTE),         04040800
    GET, I (INSERT), LOCK, M (MODIFY), OUT, P (PRINT), RESTART,             04040900
    SAVE, S (SEARCH), SYSTEM, UNLOCK.  SEE TM-4422/002 FOR DETAILS.         04041000
275.195 REPEAT WITH FEWER NAMES.                                            04041100
276.310 ENTER A NAME THAT CAN LATER BE USED WITH THE BUILD COMMAND.         04041200
277.277 ENTRY     ON DISK? TAPE ASSIGNMENT                                  04041300
278.278 STUDENT RECORD IS BEING USED.                                       04041400
279.120 THIS TAPE ALREADY CONTAINS UNLOADED RECORDS.                        04041500
280.120 ILLEGAL AUDLOG/DELLOG FORMAT.                                       04041600
281.120 ABOVE LOGIN(S) NOT FOUND.                                           04041700
282.262 TAPE I/O ERROR.                                                     04041800
283.60 BUSY.  ENTER COMMAND.                                                04041900
284.284 TOO MANY CHARACTERS ON INPUT LINE                                   04042000
285.285 ITEM                                                                04042100
286.272( 102) OK? (Y/N)                                                     04042200
287.201 R/O                                                                 04042300
288.200 R/W                                                                 04042400
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289.289 LOCKED                                                      04042500
290.290 STUDENT                                                     04042600
291.291 UNLOCKED                                                    04042700
292.304 NOT FOUND/NOT ACTIVE                                        04042800
293.293 NUMBER OF JOBS ENQUEUED:                                    04042900
294.120 NOT READY YET.                                              04043000
295.295 DUPLICATE USE OF RECORD IN:                                 04043100
296.296 CHAINED RECORD ERROR IN:                                    04043200
297.297 DELETE ALL RECORDS, YOU? (Y/N)                              04043300
298.60 UNEXPECTED END OF TAPE.                                      04043400
299.120 SOME RECORDS WERE ALREADY UNLOADED ON ANOTHER TAPE.         04043500
300.120 REQUEST ABANDONED.                                          04043600
301.301 END OF REQUESTED SEQUENCE.                                  04043700
302.60 INCORRECT LESSON NAME GIVEN.                                 04043800
303.233 NAME ASSIGNMENT COULD NOT BE MADE                           04043900
304.304 AUTHOR HAS LOCKED THE LESSON, YOU WILL BE LOGGED OUT        04044000
305.305 LESSON OR SRM IN USE, CANNOT DELETE OR UNLOAD.              04044100
306.305 SAME IDENTITY ALREADY BEING USED FOR THIS LESSON.           04044200
307.307 UNAUTHORIZED.                                               04044300
308.60(148) BUSY                                                    04044400
309.1 COMPUTED GO TO OUT OF RANGE
310.276 ENTER FILE NAME.                                            04044600
311.311 ENTER REEL NO.                                              04044700
313.313 NOT LOGGED IN.                                              04044800
314.314 PLANIT ERROR                                                04044900
315.315 SYSTEM SHUTDOWN? (Y/N)                                      04045000
316.T09 TO GET FROM TAPE, TYPE 'GET LESSONNAME 1234'               04045100
   (FILL IN YOUR OWN LESSONNAME AND REEL NUMBER).                   04045200
317.60 EMPTY LESSON DELETED.  ENTER COMMAND.                        04045300
318.1 REVIEW(ANYLABEL) -- TYPE 'REVIEW' TO GET THE LIST.            04045400
319.1 SORT(MATRIX/NAME) -- SORTS VALUES IN MATRIX.                  04045500
320.320 DEVICE STATUS:                                             04045600
ADDLOG /FRYE/CHE/CHUCK/BAKER/LARSON/SERRAS/BERG/CILVE/HOFF/FLETCH/   04045700
ADDLOG /STU01/STU02/STU03/STU04/STU05/STU06/STU07/STU08/STU0//       04045800
C:USE AS MANY ADDLOG CARDS AS NECESSARY AND AS MANY NAMES ON EACH    04045900
C:CARD AS DESIRED.  ONLY THE $$$$ CARD MAY FOLLOW ADDLOG CARDS.      04046000
$$$$$$$$$                                                           04046100
 451 CARDS.
```

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++WRITE  PRINT,PLAN10                                   00001
      1  IFIRST(1)                                       00001
      2  MSGTBL(125)                                     00002
    127  KARDUM                                          00003
    128  KARSET(57)                                      00004
    185  MAPDUM                                          00005
    186  MAP(255)                                        00006
    441  PRIME(25)                                       00007
    491  PRICES(4)                                       00008
    499  MSGOPR(20)                                      00009
    519  MSGOPN                                          00010
    520  MCHPHN(26)                                      00011
    546  INNPRT                                          00012
    547  IPART(100)                                      00013
    647  IDISK(50)                                       00014
    697  LUGNR(9)                                        00015
    706  ICWH                                            00016
    707  IETIME                                          00017
    708  JOUTBF(1170)                                    00018
   1878  JCNT                                            00019
   1879  JDIAL(23)                                       00020
   1902  ISPOOL(10)                                      00021
   1912  JSPOOL(10)                                      00022
   1922  LPAR                                            00023
   1923  ILIST                                           00024
   1924  IPUNCH                                          00025
   1925  IRDR                                            00026
   1926  ISYS(62)                                        00027
   1988  NEGPOS(2)                                       00028
   1990  IDCHK(2)                                        00029
   1992  MSGDR1(330)                                     00030
   2322  MSGDR2(330)                                     00031
   2652  IBLANK                                          00032
   2653  MAGTBL(10)                                      00033
   2663  NOCMBN(25)                                      00034
   2688  IASMD(3)                                        00035
   2691  IDSMA(3)                                        00036
   2694  IDVCE(9)                                        00037
   2703  IRSTAT(9)                                       00038
   2712  IWSTAT(9)                                       00039
   2721  IDIAL(9)                                        00040
   2730  IFPTR(9)                                        00041
   2739  ISTAT(9)                                        00042
   2748  IDASP1(9)                                       00043
   2757  IDALOG                                          00044
   2758  IFBTK(11)                                       00045
   2769  IFBTM(11)                                       00046
   2780  IFBTN(11)                                       00047
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   2792  IOPRTR                                          00049
   2793  IOPER                                           00050
   2794  IAUX                                            00051
   2795  PI                                              00052
   2797  IRAND                                           00053
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5984  ISVDWN                                        00163
5985  ITRFLG                                        00164
5986  IWKPTR                                        00165
5987  JWKPTR                                        00166
5988  KWKPTR                                        00167
5989  LWKPTR                                        00168
5990  LFMT                                          00169
5991  LMARG                                         00170
5992  IRMARG                                        00171
5993  LSBLNK                                        00172
5994  LSBLWD                                        00173
5995  ILNPR                                         00174
5996  JLNPR                                         00175
5997  KLNPR                                         00176
5998  MLNPR                                         00177
5999  NLNPR                                         00178
6000  INTR                                          00179
6001  MINT                                          00180
6002  NINT                                          00181
6003  MOVER                                         00182
6004  MVEND                                         00183
6005  INT                                           00184
6006  ISKIP                                         00185
6007  LINEUP                                        00186
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6030  LSTCHR                                        00198
6031  NWRK                                          00199
6032  NPCNT                                         00200
6033  NAMBEG                                        00201
6034  NPREV                                         00202
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6036  NUMPRS                                        00204
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6038  MFOR                                          00206
6039  NDKTR                                         00207
6040  NSRCH(75)                                     00208
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6116  NUNITR                                        00210
6117  NCONN                                         00211
6118  MEMORY                                        00212
6119  LIBSV                                         00213
6120  LIBUSE                                        00214
6121  ITMNME(2)                                     00215
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6124  LBYTE(80)      00217
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6206  IWORK(164)     00219
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6430  NOP2(60)       00221
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6610  EXP2(60)       00223
6730  MFRAME(320)    00224
7050  NFRAME(320)    00225
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7372  MNNENT(2)      00227
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| 2793 | IOPER | 00476 |
| 2792 | IOPRTR | 00477 |
| 7595 | IORST(15) | 00478 |
| 7391 | IPAREN | 00479 |
| 547 | IPART(10) | 00480 |
| 7393 | IPMPTR | 00481 |
| 5653 | IPRCLE(20) | 00482 |
| 7389 | IPRPTR | 00483 |
| 1924 | IPUNCH | 00484 |
| 7580 | IPUSH(9) | 00485 |

| | | |
|---|---|---|
| 2809 | IQUANT | 00486 |
| 2797 | IRAND | 00487 |
| 1925 | IRDR | 00488 |
| 5945 | IRDWRT | 00489 |
| 4716 | IRECRD(528) | 00490 |
| 7477 | IREEL | 00491 |
| 5992 | IRMARG | 00492 |
| 3720 | IROUND | 00493 |
| 2703 | IRSTAT(9) | 00494 |
| 7577 | IRTRN | 00495 |
| 5981 | ISCFLG | 00496 |
| 6006 | ISKIP | 00497 |
| 1902 | ISPOOL(10) | 00498 |
| 5950 | ISRBYT(10) | 00499 |
| 2798 | ISTART | 00500 |
| 2739 | ISTAT(9) | 00501 |
| 7383 | ISTFLG | 00502 |
| 7485 | ISTOP(20) | 00503 |
| 2806 | ISTOP1 | 00504 |
| 2807 | ISTOP2 | 00505 |
| 7475 | ISTUD(2) | 00506 |
| 5983 | ISVBYT | 00507 |
| 5980 | ISVDEC | 00508 |
| 5984 | ISVDWN | 00509 |
| 2810 | ISWAP | 00510 |
| 7505 | ISYS1 | 00511 |
| 7514 | ISYS10 | 00512 |
| 7515 | ISYS11 | 00513 |
| 7516 | ISYS12 | 00514 |
| 7517 | ISYS13 | 00515 |
| 7518 | ISYS14 | 00516 |
| 7519 | ISYS15 | 00517 |
| 7506 | ISYS2 | 00518 |
| 7507 | ISYS3 | 00519 |
| 7508 | ISYS4 | 00520 |
| 7509 | ISYS5 | 00521 |
| 7510 | ISYS6 | 00522 |
| 7511 | ISYS7 | 00523 |
| 7512 | ISYS8 | 00524 |
| 7513 | ISYS9 | 00525 |
| 1926 | ISYS(62) | 00526 |
| 7384 | ITIME | 00527 |
| 6121 | ITMNME(2) | 00528 |
| 5970 | ITOBYT(10) | 00529 |
| 5948 | ITPCNT | 00530 |
| 5985 | ITRFLG | 00531 |
| 7385 | ITYM | 00532 |
| 7396 | IVLEND | 00533 |
| 5986 | IWKPTR | 00534 |
| 6206 | IWORK(164) | 00535 |
| 2712 | IWSTAT(9) | 00536 |
| 7451 | IXFER | 00537 |
| 7551 | J | 00538 |
| 1878 | JCNT | 00539 |

| | | |
|---|---|---|
| 1879 | JDIAL(23) | 00540 |
| 7380 | JDLFLG | 00541 |
| 7455 | JFTYPE | 00542 |
| 7426 | JHOLD(9) | 00543 |
| 5996 | JLNPR | 00544 |
| 2808 | JOB | 00545 |
| 708 | JOUTBF(1170) | 00546 |
| 7478 | JREEL | 00547 |
| 1912 | JSPOOL(10) | 00548 |
| 7483 | JSYS(2) | 00549 |
| 5987 | JWKPTR | 00550 |
| 7552 | K | 00551 |
| 127 | KARDUM | 00552 |
| 128 | KARSET(57) | 00553 |
| 7407 | KBLNO1 | 00554 |
| 7408 | KBLNO2 | 00555 |
| 7458 | KBR | 00556 |
| 7462 | KCORE | 00557 |
| 7444 | KDKTR | 00558 |
| 3723 | KEEPID(2) | 00559 |
| 7409 | KENTRY | 00560 |
| 3610 | KFEP(34) | 00561 |
| 7465 | KFLG | 00562 |
| 7411 | KFNBR | 00563 |
| 7402 | KFNBRX | 00564 |
| 7452 | KFONLY | 00565 |
| 7456 | KFTYPE | 00566 |
| 7412 | KGNBR | 00567 |
| 7453 | KGONLY | 00568 |
| 7413 | KLNBR | 00569 |
| 7466 | KLNBR1 | 00570 |
| 5997 | KLNPR | 00571 |
| 7454 | KLONLY | 00572 |
| 5919 | KNEG | 00573 |
| 7414 | KOMNR | 00574 |
| 7457 | KOPY | 00575 |
| 5634 | KPTR(8) | 00576 |
| 7460 | KRWS | 00577 |
| 7459 | KTYPE | 00578 |
| 5248 | KURRYL | 00579 |
| 7470 | KUSER | 00580 |
| 5989 | KWKPTR | 00581 |
| 7463 | KWRDS | 00582 |
| 2801 | KYPBRK | 00583 |
| 7553 | L | 00584 |
| 5486 | LAB1(94) | 00585 |
| 5580 | LAB2(48) | 00586 |
| 7441 | LANS1 | 00587 |
| 7442 | LANS2 | 00588 |
| 7443 | LANS3 | 00589 |
| 5245 | LBNENT | 00590 |
| 7467 | LBRK1 | 00591 |
| 7468 | LBRK2 | 00592 |
| 6124 | LBYTE(80) | 00593 |

| | | |
|---|---|---|
| 7404 | LCNT | 00594 |
| 7446 | LDEC | 00595 |
| 7405 | LDIR1 | 00596 |
| 7406 | LDIR2 | 00597 |
| 3644 | LEP(14) | 00598 |
| 5833 | LESLIN(80) | 00599 |
| 7400 | LESNAM | 00600 |
| 5246 | LESSON(2) | 00601 |
| 5990 | LFMT | 00602 |
| 3729 | LFND | 00603 |
| 3731 | LFREXD | 00604 |
| 3727 | LHSCOM | 00605 |
| 7381 | LHSEQ | 00606 |
| 6119 | LIBSV | 00607 |
| 5642 | LIBS(10) | 00608 |
| 6120 | LIBUSE | 00609 |
| 6007 | LINEUP | 00610 |
| 5991 | LMARG | 00611 |
| 3730 | LNBR | 00612 |
| 3725 | LNCORR(2) | 00613 |
| 3474 | LOCTAG | 00614 |
| 697 | LOGNR(9) | 00615 |
| 7394 | LOK | 00616 |
| 7449 | LOOP | 00617 |
| 1922 | LPAR | 00618 |
| 7440 | LPLUS | 00619 |
| 5918 | LPSW | 00620 |
| 3716 | LPTATX | 00621 |
| 3717 | LPTMFU | 00622 |
| 7403 | LPTR | 00623 |
| 3740 | LREPLY(2) | 00624 |
| 7401 | LRET | 00625 |
| 5993 | LSBLNK | 00626 |
| 5994 | LSBLWD | 00627 |
| 3738 | LSDFT(2) | 00628 |
| 5250 | LSDR1(113) | 00629 |
| 5363 | LSDR2(118) | 00630 |
| 5244 | LSNENT | 00631 |
| 6030 | LSTCHR | 00632 |
| 3475 | LSTNAM(2) | 00633 |
| 3732 | LSTPTR(6) | 00634 |
| 3721 | LSTRYL | 00635 |
| 7447 | LSW | 00636 |
| 7439 | LTAG | 00637 |
| 5916 | LTOC | 00638 |
| 5989 | LWKPTR | 00639 |
| 7554 | M | 00640 |
| 2653 | MAGTBL(10) | 00641 |
| 186 | MAP(255) | 00642 |
| 185 | MAPDUM | 00643 |
| 2804 | MBKGND | 00644 |
| 5913 | MBUMSG | 00645 |
| 520 | MCHPHN(26) | 00646 |
| 6029 | MCUESV | 00647 |

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6024   MCUE                                                   00648
3728   MDE                                                    00649
3477   MDEF(133)                                              00650
6118   MEMORY                                                 00651
6038   MFOR                                                   00652
6730   MFRAME(320)                                            00653
3666   MFUNSV(50)                                             00654
6023   MINFLG                                                 00655
6001   MINT                                                   00656
7416   MKIND                                                  00657
3663   MKNT1                                                  00658
3664   MKNT2                                                  00659
5998   MLNPR                                                  00660
7377   MNFSW                                                  00661
7372   MNNENT(2)                                              00662
7370   MNSTAT(2)                                              00663
7589   MODES                                                  00664
5938   MODFLG                                                 00665
6003   MOVER                                                  00666
3662   MQUIT                                                  00667
5673   MSGBUF(160)                                            00668
1992   MSGDR1(330)                                            00669
2322   MSGDR2(330)                                            00670
7590   MSGNO                                                  00671
 519   MSGOPN                                                 00672
 499   MSGOPR(20)                                             00673
   2   MSGTBL(125)                                            00674
5629   MSVMSG(6)                                              00675
6004   MVEND                                                  00676
7555   N                                                      00677
6033   NAMBEG                                                 00678
2812   NAMES(480)                                             00679
3292   NAMESX(180)                                            00680
2805   NBKGND                                                 00681
3472   NBRNAM(2)                                              00682
3722   NBRRYL                                                 00683
7469   NCALC                                                  00684
2799   NCHBEG                                                 00685
7410   NCODE                                                  00686
7445   NCONJ                                                  00687
6117   NCONN                                                  00688
6115   NCPU                                                   00689
6037   NDCHAR                                                 00690
5924   NDEX(5)                                                00691
6039   NDKTR                                                  00692
1988   NEGPOS(2)                                              00693
5249   NEWORD                                                 00694
5949   NEXT                                                   00695
7382   NFNLSV                                                 00696
7050   NFRAME(320)                                            00697
7378   NFULL                                                  00698
6028   NFUNL                                                  00699
6002   NINT                                                   00700
7379   NLINE                                                  00701
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| | | |
|---|---|---|
| 5999 | NLNPR | 00702 |
| 7448 | NMAP | 00703 |
| 7482 | NMREEL | 00704 |
| 5946 | NMRPLY | 00705 |
| 2663 | NUCMBN(25) | 00707 |
| 6370 | NOP1(60) | 00708 |
| 6430 | NOP2(60) | 00709 |
| 3661 | NOTFUL | 00710 |
| 6027 | NPACK | 00711 |
| 7450 | NPASS | 00711 |
| 6032 | NPCNT | 00712 |
| 5920 | NPNT1 | 00713 |
| 5921 | NPNT2 | 00714 |
| 6034 | NPREV | 00715 |
| 6123 | NPRSV | 00717 |
| 5929 | NPTR | 00718 |
| 7591 | NREAD | 00719 |
| 3658 | NREC1 | 00720 |
| 3659 | NREC2 | 00721 |
| 3660 | NREC3 | 00722 |
| 3742 | NREPLY(40) | 00723 |
| 7387 | NRMFLG | 00724 |
| 6040 | NSRCH(75) | 00725 |
| 7395 | NSVPRS | 00726 |
| 7526 | NTMP1 | 00727 |
| 7535 | NTMP10 | 00728 |
| 7536 | NTMP11 | 00729 |
| 7537 | NTMP12 | 00730 |
| 7538 | NTMP13 | 00731 |
| 7539 | NTMP14 | 00732 |
| 7540 | NTMP15 | 00733 |
| 7541 | NTMP16 | 00734 |
| 7542 | NTMP17 | 00735 |
| 7543 | NTMP18 | 00736 |
| 7544 | NTMP19 | 00737 |
| 7527 | NTMP2 | 00738 |
| 7545 | NTMP20 | 00739 |
| 7546 | NTMP21 | 00740 |
| 7547 | NTMP22 | 00741 |
| 7548 | NTMP23 | 00742 |
| 7549 | NTMP24 | 00743 |
| 7528 | NTMP3 | 00744 |
| 7529 | NTMP4 | 00745 |
| 7530 | NTMP5 | 00746 |
| 7531 | NTMP6 | 00747 |
| 7532 | NTMP7 | 00748 |
| 7533 | NTMP8 | 00749 |
| 7534 | NTMP9 | 00750 |
| 7374 | NTRYF | 00751 |
| 7375 | NTRYG | 00752 |
| 7376 | NTRYL | 00753 |
| 2800 | NUMCH | 00754 |
| 6035 | NUMFLG | 00755 |
| 6036 | NUMPRS | |

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 6116  NUNITR                              00756
 6025  NWRD1                               00757
 6026  NWRD2                               00758
 6031  NWRK                                00759
 7575  NXTPRT                              00760
 7556  N1                                  00761
 7557  N2                                  00762
 2795  PI                                  00763
  491  PRICES(4)                           00764
  441  PRIME(25)                           00765
 3782  RSPNSE                              00766
 7564  TEMP1                               00767
 7566  TEMP2                               00768
 7568  TEMP3                               00769
 7570  TEMP4                               00770
 7397  VALUE                               00771
 3718  WITHIN                              00772
 6204  X(1)                                00773
 7435  XHOLD                               00774
 7558  X1                                  00775
 7560  X2                                  00776
 7437  YHOLD                               00777
 7562  Y1                                  00778
&ENDPROG                                   00779
```

# APPENDIX H

## TACFIRE/TOS$^2$ EQUIPMENT PICTURES

This appendix includes a set of pictures of the TACFIRE and TOS$^2$ equipment items most frequently used during operation of the AN/GYK-12 PLANIT system. The equipment items shown are those which include significant PLANIT operator/author/student interface. The figures are as follows:
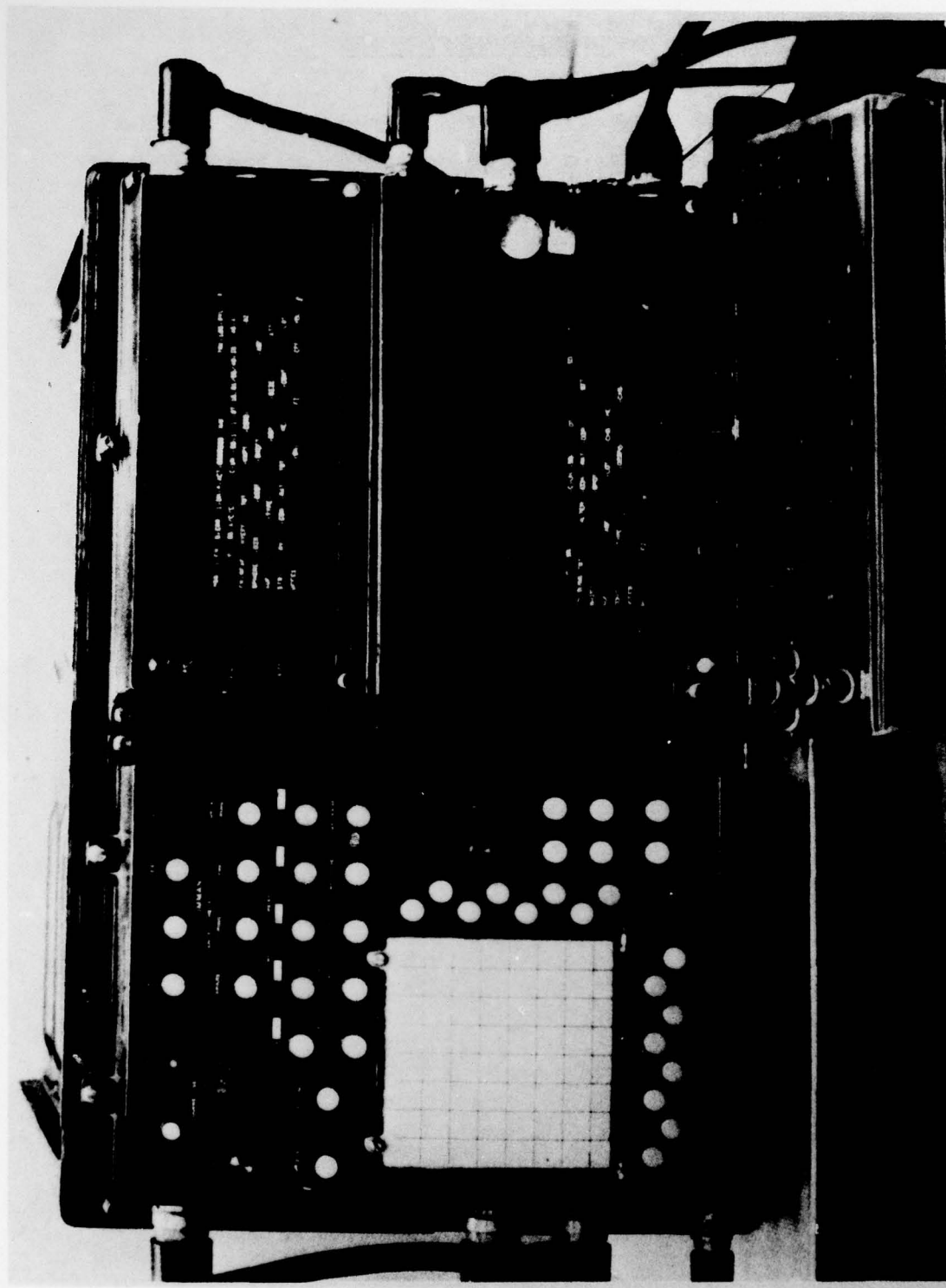
Figure H-1.  Artillery Control Console (ACC)/
Operator Control Console (OCC)
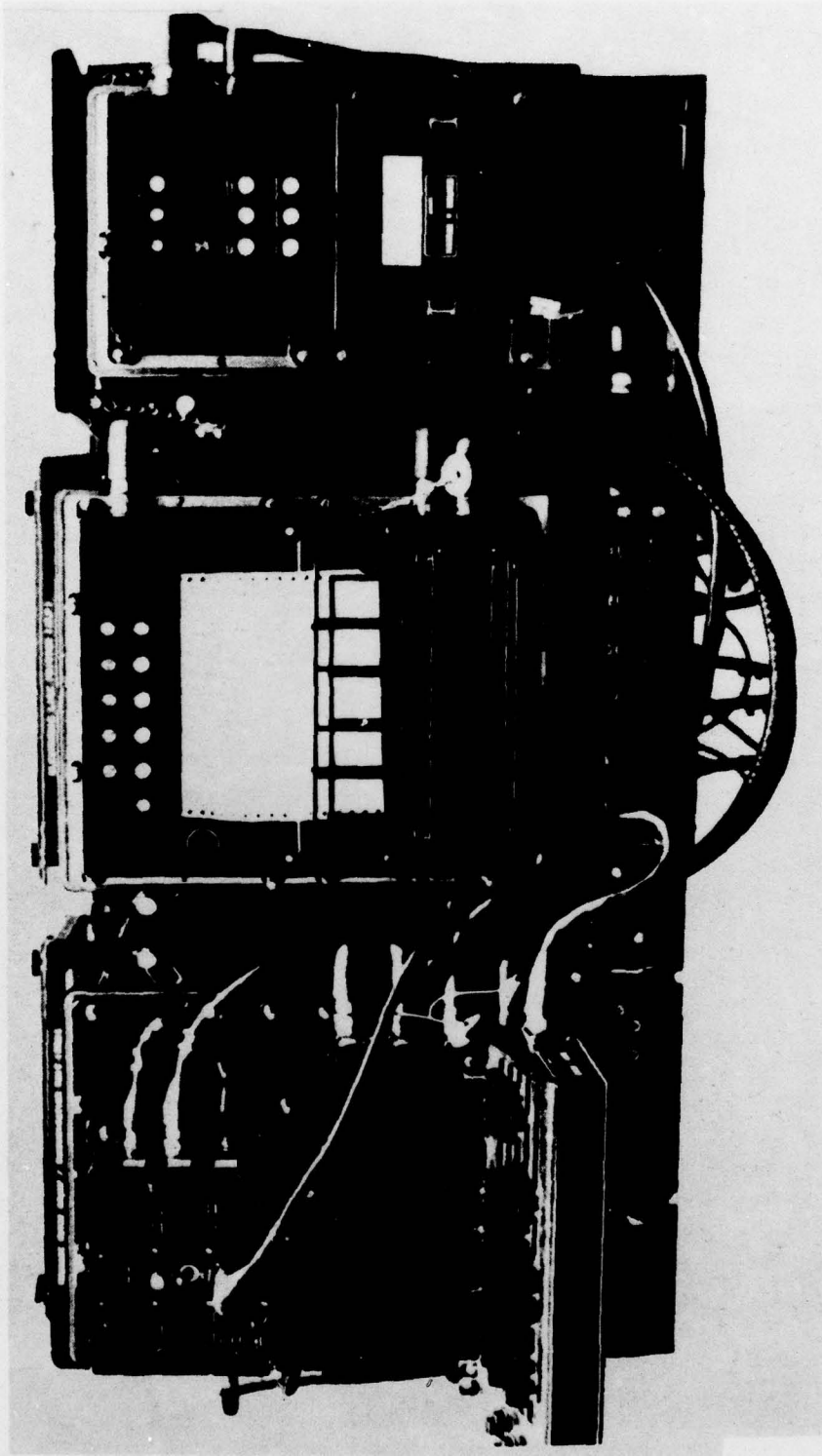
Figure H-2.  Variable Format Message Entry Device (VFMED)

Figure H-3.  Message Input/Output Device (MIOD)
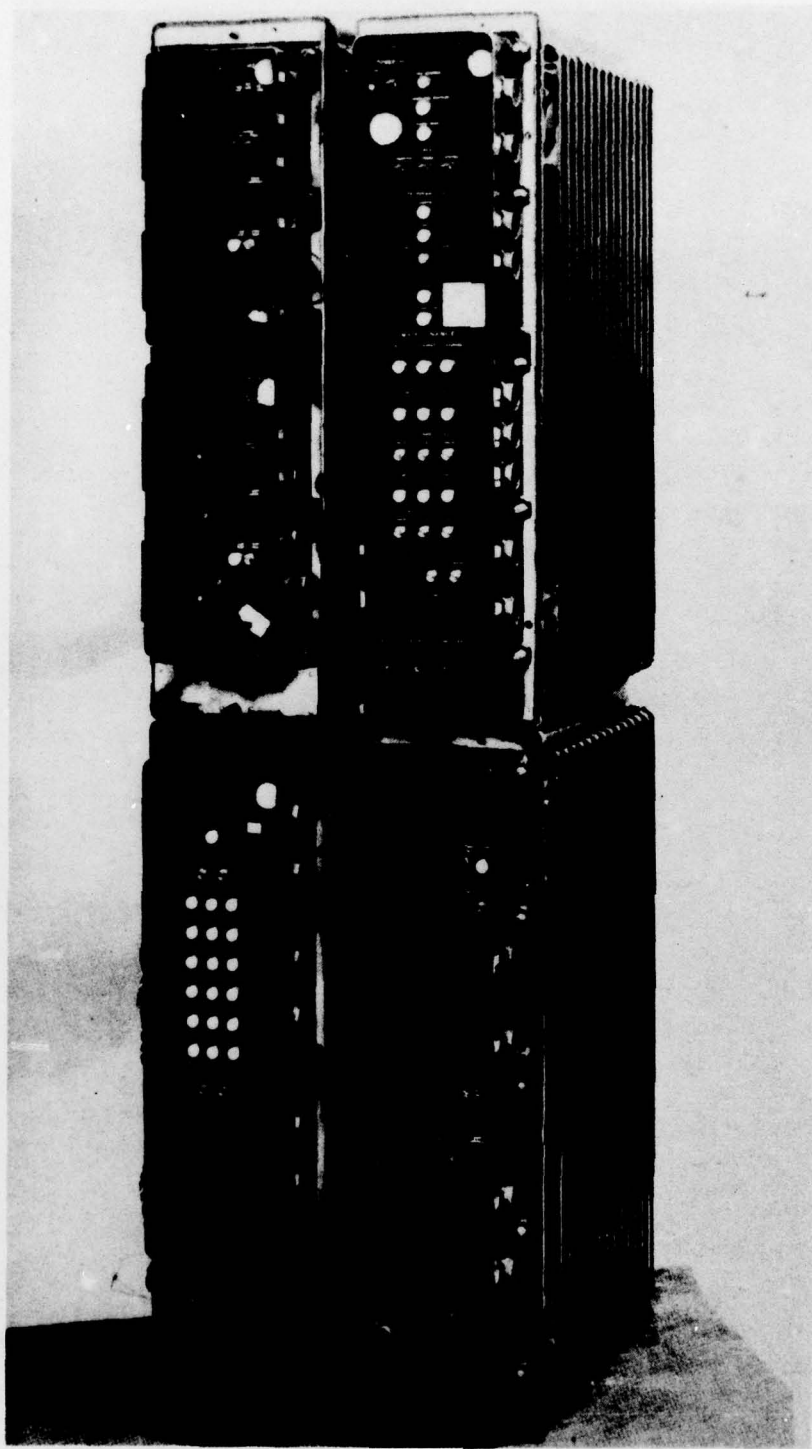
Figure H-4.  Electronic Line Printer (ELP)

Figure H-5.  AN/GYK-12 Computer
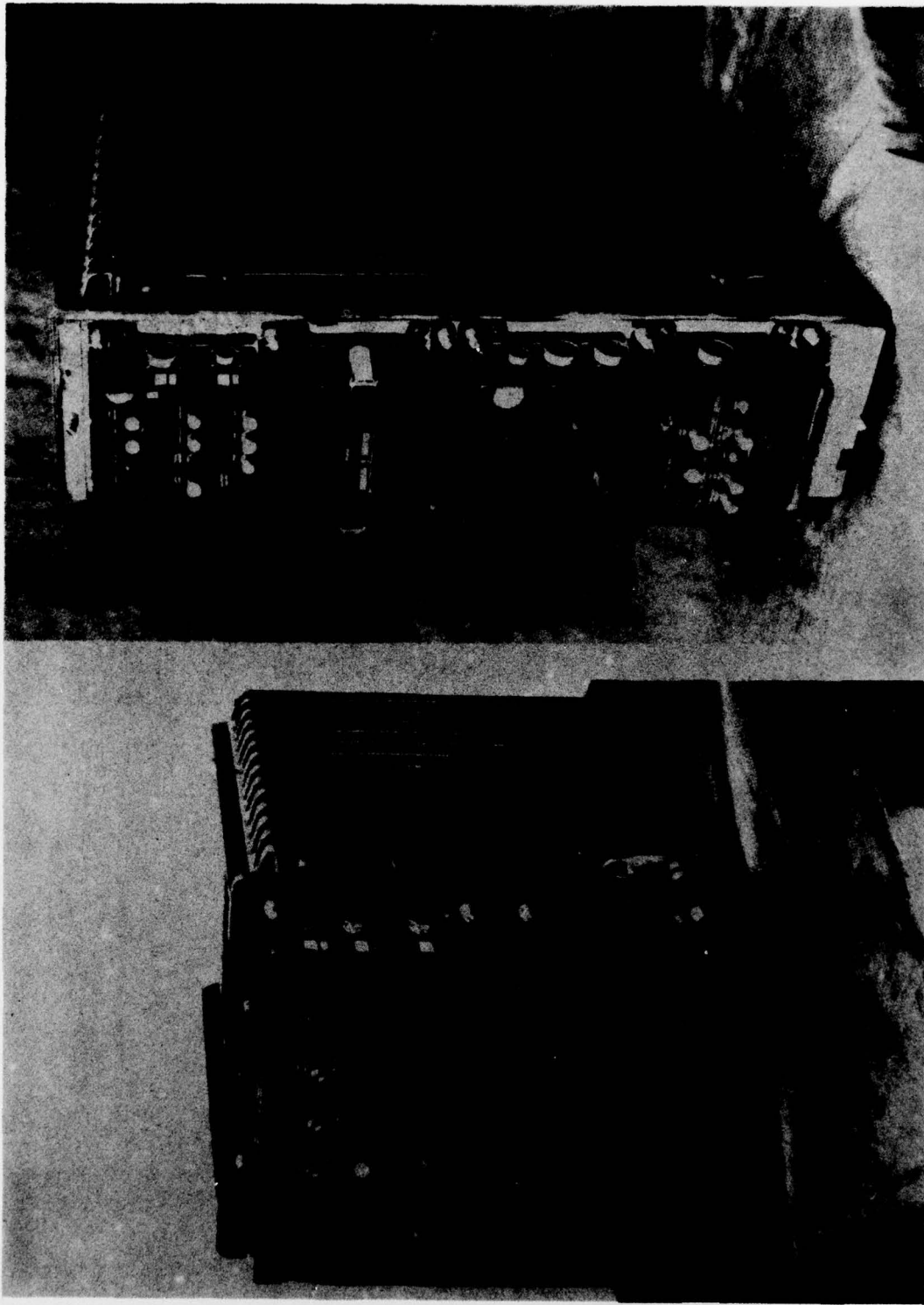[CPU, IOU, (2) 8K Memories, MCMU]

Figure H-6.  Auxiliary Removable Media Memory (ARMM)
and Random Access Memory (RAM)

Figure H-7.  (TOS$^2$) Potter Tape Unit

Figure H-8.  Digital Data Terminal (DDT)

Figure H-9.  Computer Test Set (CTS)

Figure H-1. Artillery Control Console (ACC)/
Operator Control Console (OCC)
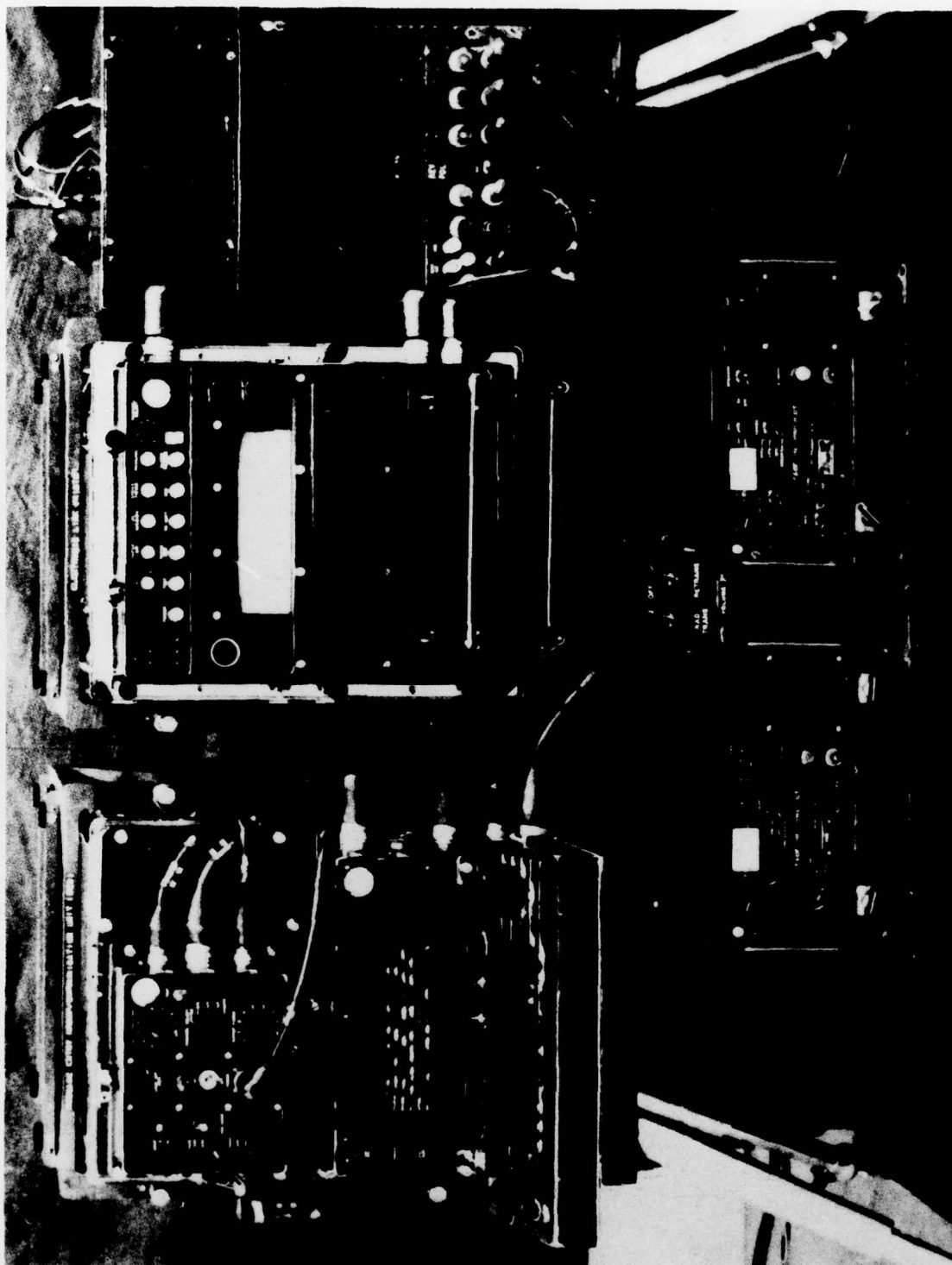
Figure H-2. Variable Format Message Entry Device (VFMED)

Figure H-3. Message Input/Output Device (MIOD)
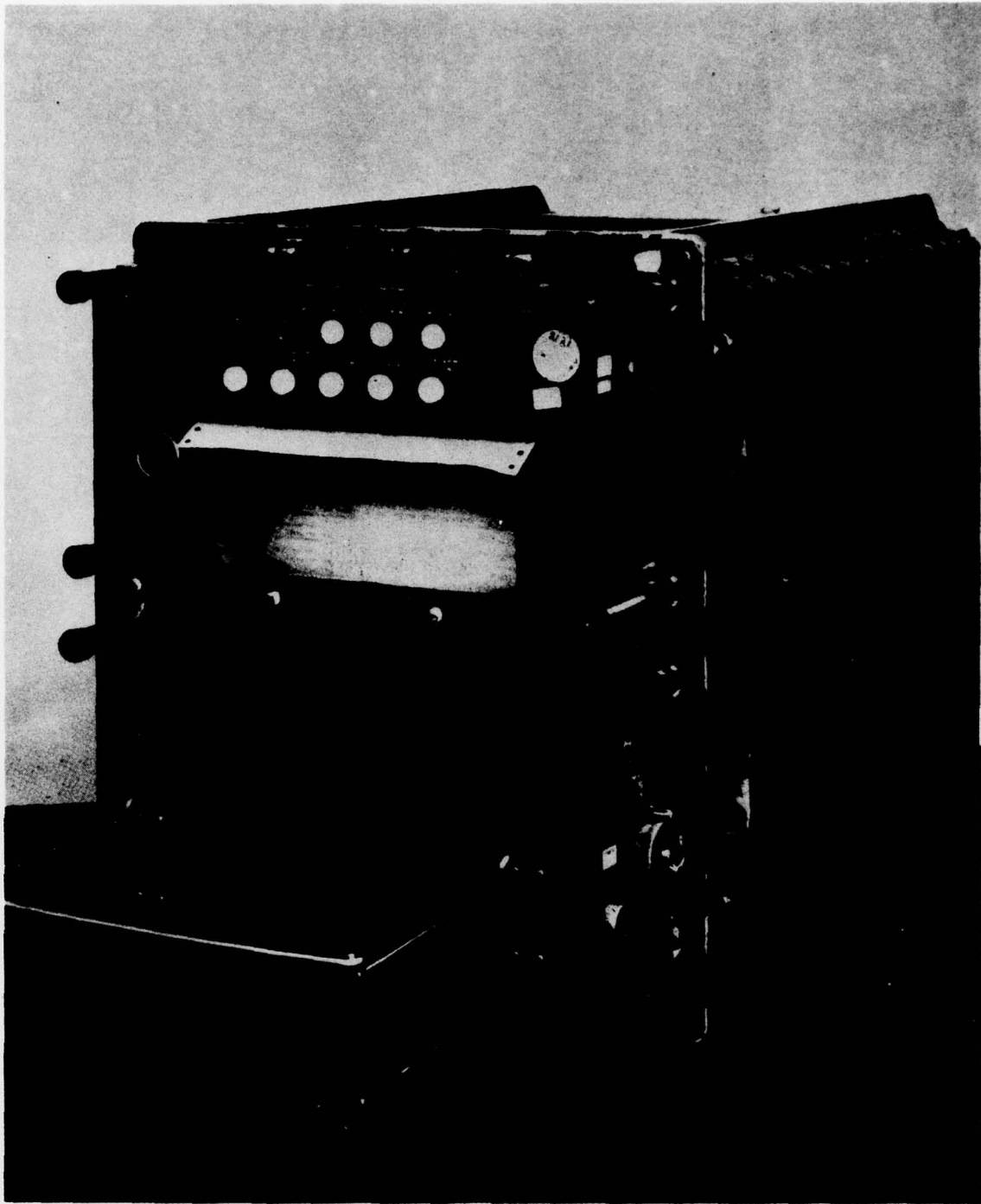
Figure H-4.  Electronic Line Printer (ELP)

Figure H-5.   AN/GYK-12 Computer

H-6

Figure H-6. Auxiliary Removable Media Memory (ARMM) and Random Access Memory (RAM)
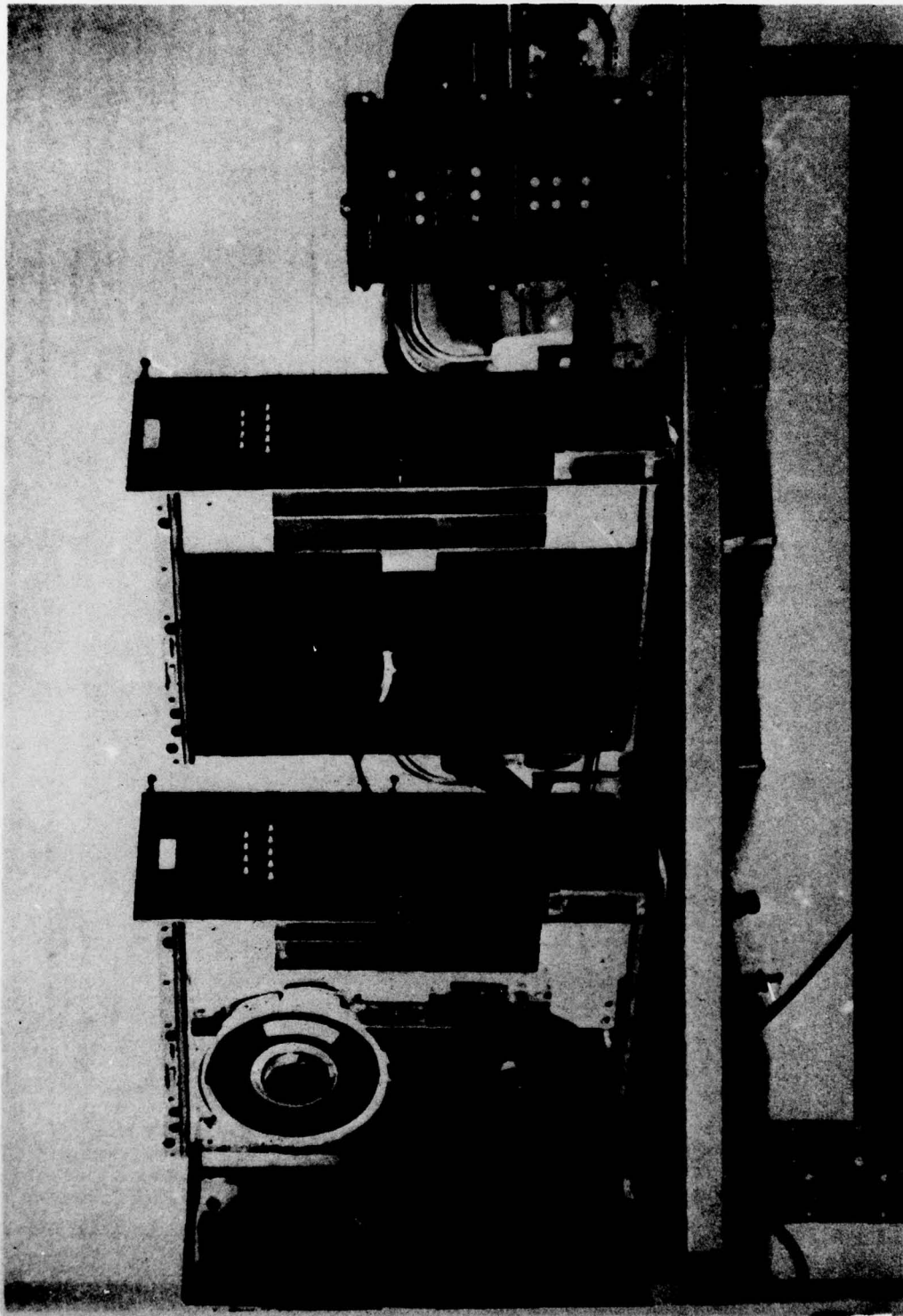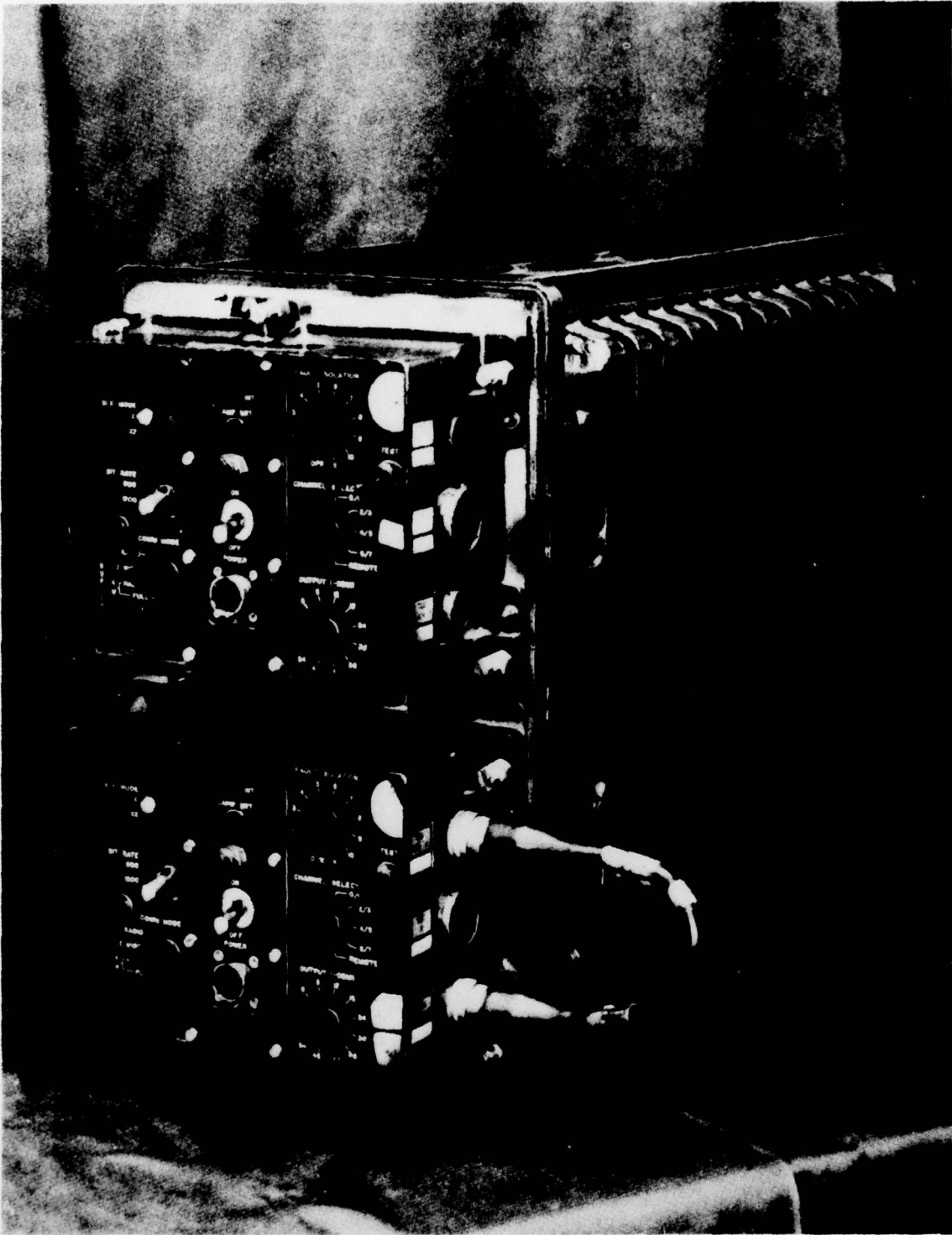
Figure H-7. (TOS$^2$) Potter Tape Unit

Figure H-8.   Digital Data Terminal (DDT)

Figure H-9. Computer Test Set (CTS)

# APPENDIX I

## GLOSSARY OF TERMS

### A

ACC - (TACFIRE) Artillery Control Console

ACCCE/ACCCED - (ACC) Compose Edit (lower) Display

ACCRD - (ACC) Receive (upper) Display

ACCSA - (ACC) Switch Assembly

ARMM - Auxiliary Removable Media Memory Unit (includes MLU)

### B

BOT - Beginning of Tape

BSL - Bootstrap Load

### C

CE/CED - Compose Edit Display on the ACC or OCC (Same as ACCCED
(C/E)    or OCCCED)

CPU - AN/GYK-12 Computer Central Processing Unit

CTS - Computer Test Set

### D

DDT - Digital Data Terminal

DE - Display Editor

DIG - (CPU) Diagnose Status Lights

DPM - Digital Plotter Map (not used with PLANIT)

I-1

## E

ELP - Electronic Line Printer

EOT - End of Tape

ETD - Electronic Tactical Display (not used with PLANIT)

## F

FI - Fault Isolation program(s), part of AN/GYK-12 system software
     (not a part of PLANIT system)

FINAL - AN/GYK-12 PLANIT System Final (termination of PLANIT
        System operations) program module

FSU - (MIOD) Format Storage Unit (not used with PLANIT)

## H

HSP - High Speed Printer (commercial peripheral printer in SSS
      and PSSB)

## I

IOU - AN/GYK-12 Computer Input/Output Unit

## K

KB - Alphanumeric Keyboard

## L

LSS - L-3050 Support Software (General Utility Programs)

## M

MADCAP - Maintenance and Diagnostic Control and Activation Program (MADCAP Operating System used as basic building block for POS)

MCMU - Mass Core Memory Unit (131 k words, 32 bits plus parity per word)

MEOF - MADCAP End of File

MIOD - ($TOS^2$) Message Input/Output Device

MIOP - Machine Input/Output Program

MLU - Memory Load Unit (part of ARMM, includes TTC)

## O

OCC - ($TOS^2$) Operator Control Console

OCCCE/OCCCED - (OCC) Compose Edit (lower) Display

OCCRD - (OCC) Receive (upper) Display

OCCSA - (OCC) Switch Assembly

## P

PCG - Power Converter Group

PEBU - Peripheral Equipment Buffer Unit

PLAN 1 - PLANIT Overlay 1 Program Module

PLAN 2 - PLANIT Overlay 2 Program Module

PLAN 3 - PLANIT Overlay 3 Program Module

PLAN 4 - PLANIT Overlay 4 Program Module

PLAN 5 - PLANIT Overlay 5 Program Module

PLAN 6 - PLANIT Overlay 6 Program Module

PLAN 7 - PLANIT Overlay 7 Program Module

PLAN 8 - PLANIT Overlay 8 Program Module

## P

PLANIT - Programming Language for Interactive Teaching
   Note:  This is also the name given to the PLANIT MAIN
          program module.

POS -  PLANIT Operating System

PSSB - (TACFIRE) Programming Support System B

PUP - PLANIT Utility Program

## R

RAM - Random Access Memory (drum)

RAMCHECK - RAM track check program

RAMFI - RAM Fault Isolati n program, part of AN/GYK-12 system
          software (not a part of PLANIT system)

RD - Read-only Display on the ACC or OCC (same as ACCRD or OCCRD)

RMMU - Removable Media Memory Unit (Same as ARMM)

## S

SA - (ACC/OCC) Switch Assembly

SSS - (TOS$^2$) Software Support System

START - AN/GYK-12 PLANIT System Start program module

## T

TACFIRE - Tactical Fire Direction System (U. S. Army Artillery)

TACPOL - Tactical Procedure Oriented Language (programming language
          for the AN/GYK-12 computer)

TMIOP - Terminal MIOP

TOS$^2$ - Tactical Operating System Operable Segment

TTC -  (ARMM/MLU) Tape Transport Cartridge

VFMED - (TACFIRE) Variable Format Message Entry Device